

State of Industry Report 2018







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State of Industry Report 2018

National Electric Power Regulatory Authority

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FOREWORD

Pakistan initiated a reform process in early nineties to bring efficiency in the power sector, however apart from addition of generation capacity and improvement in power supply position at different times, the sector still suffers from unreliable power supply due to transmission and distribution system constraints and other inefficiencies. The electricity consumers are still getting expensive electricity due to external and internal factors. The new government has major challenges at hand to revive a collapsing sector.

Due to heavy dependence of power generation on imported fuels, the price of imported fuels is among the major external factors, which directly impacts the cost of electricity generation. With the rapid depletion of indigenous gas at subsidized price, the space for other options is limited. The internal factors also continue to add to the inefficiencies, leading to expensive energy mix. The Federal Government being the owner of GENCOs in the public sector has not decided about the fate of inefficient GENCOs. The constraints in transmission and distribution networks have forced the system operator to underutilize available generation capacities and curtailment of power supplied by conventional fuel and wind energy power plants.

On an overall basis, XW-DISCOs have failed to reduce their T&D losses. The DISCOs reported actual losses of 18.6% in the FY 2013-14, showed a slight dip to 17.95% in FY 2016-17, whereas in FY 2017-18 reported losses of 18.32%. The recovery of billed amount also shows similar trends. The actual recovery ratio was at 89.11% in FY 2013-14, which improved to 94.45% in FY 2015-16; however, the position again deteriorated to 87.71% in FY 2017-18. As a result, the power sector circular debt is touching Rupees 1,200 billion mark, with continued addition of approximately Rupees 200-250 billion annually. The Federal Government has contemplated to stop incremental additions to circular debt through certain measures like budgeting subsidy amounts; notification of NEPRA determined tariffs and other measures to control losses. However, it is to be noted that efforts to improve through such accounting measures, so that balance sheets of DISCOs show a healthy position, would not suffice. Fundamental issues of governance, capacity and induction of technological improvements in operations are to be addressed forthwith.

Performance of XW-DISCOs and GENCOs, throughout this period of more than two decades, calls for their due independence, as continued centralized control, has defeated the main objectives of the reform process. The regulator notes that under the given scenario the existing setup would not be able to deliver, therefore it is recommended that structural changes like privatization of DISCOs must be given serious consideration to save the sector.

With the amendments in NEPRA Act in April 2018, an entirely new regulatory regime has been introduced. It is however noted that due deliberations were not done before approval of the Amendments. Requirement to maintain a uniform tariff throughout the country and certain new concepts in the Act are not consistent. Furthermore, work is being carried out to develop a competitive market model, which it appears is not based on comprehension about the ground realities in general and capacity levels of the stakeholders in particular. There is a need to identify gaps in the existing working of the relevant departments and their ability to undertake any sort of potential market mechanism. The Regulator observes that any market model leading to centralization of operations should not be considered. In this respect, a model which may be very rudimentary but which promotes opening of the sector may be encouraged.

Sales-growth policies are needed at this time when the capacity payments are expected to rise every year. Therefore, all such measures to bring paying consumers in the system, are to be taken, instead of just adopting regressive approaches. For instance, it is not enough to just focus only, on carrying out load-shedding in areas having high losses; rather other measures to effectively reduce losses should be given more importance, for implementation. The present approach would not result in long-term viability of the sector, as the consumer-base who pays the costs of the system will further squeeze. The recent efforts of the

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new government to reduce DISCOs' T&D losses, by directly targeting high loss 11 kV transmission lines (feeders) are fully supported and it is recommended that the approach may be extended in all DISCOs so that overall loss reduction and sales expansion can be effectively realized expeditiously.

The Regulator also appreciates the policy of the government to set specific and high targets for renewable energy in the system. The implementing agencies however, should, not only fully own such stated policies, they should be geared up to take necessary steps and develop support mechanism to undertake these, so that conflicting signals are not sent to stakeholders. The government policy to introduce "net-metering" and "wheeling" has received favorable response from relevant stakeholders. The Regulator supports continuation of these, over the coming years so that competition is encouraged in the sector.

In the context of expensive energy mix, it is also proposed that the government may revisit earlier decisions to import power from Central Asian States, as it is not expected to replace any other expensive energy generation, whereas it would add to the capacity payment requirements. It would also require National Transmission Company for timely development of transmission infrastructure thus adding to already burdened company in terms of human and financial resources.

The role of National Accountability Bureau (NAB) also needs to be mentioned here, especially in the context of NEPRA. Almost all the projects on which NEPRA had made determinations in the past have been questioned by NAB, and the way the investigations are being conducted, it has completely stifled the morale of NEPRA professionals. The matter in essence has come to the jurisdiction of NEPRA and the boundaries beyond which NAB may not intervene. A holistic approach is the need of the hour so that confidence of the sector in general and that of NEPRA in particular is not unduly hurt.

The detailed statistics and data provided on the power sector in the State of Industry Report 2018, besides being a source of information, would also be useful for the decision makers as in the past.

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EXECUTIVE SUMMARY

The power sector with a circular debt of around Rupees 1,000 billion by the end of December 2018, presents a major challenge for the new government, as urgent measures are needed for the revival of a collapsed sector. After the addition of more than 10,000 MW of new generation capacity over last five years, transmission sector only, has shown improvement to some extent, whereas the distribution sector has totally gone into a failure.

A look at the following graph shows that over the last two years, the generation capacity has increased by 43% whereas the transmission and distribution transformation capacities have increased by 20% and 24% respectively.



The transmission system on June 30, 2014 was able to provide 0.86 MW of transformation capacity for every MW of installed generation capacity, whereas on June 30, 2018, transformation capacity reduced to 0.82 MW. The distribution system on June 30, 2014 was able to provide 1.43 MW of transformation capacity (at 132 kV level), for every MW of installed generation capacity, whereas on June 30, 2018, such capability declined to 1.31 MW. These indices not only show a declining trend about the adequacy of transformation capacity, but point to a larger issue of deteriorating reliability levels in the electricity supply systems.

Capacity and load factors are also important indices to judge performance of the overall sector. Capacity factor measures percentage of installed capacity that is utilized. It provides insight on how close the power supply system is to being overloaded. A high capacity factor reflects that power system usage is efficient, whereas low capacity factor indicates inefficiency in system usage. The capacity factors in PEPCO system are shown in the following table for the years 2014 to 2018. It is evident that with the lowest capacity factor over the last five years in 2018, the installed capacity has not been used efficiently.

Year	2014	2015	2016	2017	2018
Capacity Factor (%)	51.15	49.01	50.16	47.41	41.52

Load factor also provides information on how efficiently the power system equipment is used and, to a certain extent, helps understand how close the power supply system is to being overloaded. When load factor is high (i.e., average supply is only marginally below peak demand), equipment usage efficiency is high and vice versa. Load factor in PEPCO system remained around 66% to 68% from 2013 onwards, whereas

in 2017, it fell to around 64%. The two factors i.e. capacity factor and load factor are quite on the lower side in PEPCO system and in order to have improved planning and operational efficiencies, higher capacity factors and load factors are to be targeted. The policy of the Federal Government to curtail electricity supply according to technical and commercial losses may be helpful to a certain extent to reduce financial losses of the DISCOs, but it is not conducive for achieving a financially viable power sector on sustained basis.

1.1 INSTALLED POWER GENERATION CAPACITY

Installed power generation capacity of Pakistan as of June 30, 2018 stands at 36,010 MW, of which 33,126 MW is connected with NTDC system whereas 2,884 MW is connected with K-Electric Limited (KEL) system. Source wise installed capacity for the years 2016-17 and 2017-18 is shown in the following table. It may be noted that close to 5,000 MW of thermal capacity was added in the PEPCO system during the period; an increase of 27% over the last year. About 1,600 MW of hydro-based capacity was also added in the system during the same period:

As an 20 th luna	2017	2019	Variation		
As on 50 June	2017	2016	Capacity	%	
A. PEPCO/NTDC SYSTEM					
A.1 HYDEL					
WAPDA Hydel	6,902	8,341	1,439	20.85	
IPPs Hydel	214	372	158	73.83	
TOTAL HYDEL	7,116	8,713	1,597	22.44	
A.2 THERMAL	·		·		
GENCOs with PEPCO	5,897	5,637	-260	-4.41	
IPPs	10,566	15,297	4,731	44.78	
SPPs/CPPs	340	340			
CHASNUPP (I, II, III & IV)	1,005	1,330	325	32.34	
TOTAL THERMAL including Nuclear	17,808	22,604	4,796	26.93	
A.3 RENEWABLE ENERGY (WIND, SOLAR AND	BAGASSE)				
RE Power Plants connected with PEPCO	1,465	1,809	344	23.48	
TOTAL PEPCO/NTDC	26,389	33,126	6,737	25.53	
B. K-ELECTRIC SYSTEM					
KEL Own	1,874	2,294	420	22.41	
IPPs Connected with KEL	252	366	114	45.24	
SPPs/CPPs connected with KEL	87	87	0	0	
KANUPP	137	137	0	0	
TOTAL KEL	2,350	2,884	534	22.72	
Total Installed Capacity of the Country	28,739	36,010	7,271	25.30	

Source-wise Installed Capacity by Type (MW)

Source: NTDC/KEL

For future generation additions, the plans provided by NTDC last year, projected capacity additions of around 30,000 MW in NTDC system over next seven years, so that more than 62,000 MW of installed capacity would be expected by the year 2025. As reported in NEPRA State of Industry Report 2017, no renewable energy plants based on wind and solar were foreseen after 2021, which was contrary to the stated policy of the Federal Government also discussed in the next sections of this report.

1.2 POWER BALANCES

1.2.1 NTDC System:

The installed capacity does not fully contribute to energy production due to various factors like auxiliary consumption, impact of site reference conditions and seasonality effects on the renewables and large

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hydropower plants. After accounting for above factors, the capacity; known as the Generation Capability, is effectively used for meeting the electricity demand. The data about generation capability and future demand as reported by NTDC is shown in the following table. It may be noted that in the years 2019 and 2020, the generation capability would just be close to the demand, whereas in subsequent years the capability would be more than the demand:

Sulptus, Denett in Demand and Supply NTDe 5 System							
Year	Installed	Planned Generation	NTDC's Projected	NTDC's Projected	Surplus/		
ending	Capacity (NTDC	Capability as per	Demand Growth	Demand during	Deficit		
30 th June	System) (MW)	NTDC (MW)	Rate (%)	Peak Hours (MW)*	(MW)		
2019	35,870	26,887	3.90	27,261	-374		
2020	37,834	28,892	4.10	28,155	737		
2021	42,078	31,184	3.80	29,325	1,859		
2022	50,852	35,883	3.90	30,921	4,962		
2023	54,532	37,786	3.90	31,953	5,833		
2024	58,318	39,196	3.80	33,696	5,500		
2025	60,183	37,935	3.90	35,422	2,513		

Surplus/Deficit in Demand and Supply NTDC's System

* NTDC develops the Demand Projections of Peak Demand only.

• Electricity Demand Forecast based on Regression Report (Period 2018-2040)

• Summary of Power Balance based on latest IGCEP 29 October, 2018 Source: NTDC

1.2.2 K-Electric Limited System:

Following table shows power supply and demand position in KEL system based on the investment plans of KEL. It may be noted that till 2020, KEL can barely meet the expected demand at peak times and outage of a power plant or even, outage of a single unit of around 200 MW may result in breakdown of the system. Even the surplus expected in 2021 would not be enough to operate KEL system with technically prudent margins:

Surplus/Deficit in Der	nand and Suppl	y KEL System
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Year ending 30 th June	Installed Capacity (MW)	Planned Generation Capability as per KEL (MW)*	KEL's Projected Demand Growth Rate (%)	KEL's Projected Demand during Peak hours (MW)	Surplus/ Deficit (MW)
2019	2,950	3,147	8.8	3,836	-689
2020	3,200	3,361	6.5	4,087	-726
2021	4,530	4,638	7.1	4,376	262
2022	5,980	5,356	6.7	4,668	688
2023		5,356	6.1	4,952	404

* Including 650 MW from NTDC Source: KEL

1.3 PERFORMANCE OF GENERATION SECTOR

1.3.1 Public Sector (GENCOs, Nuclear and Hydel):

1.3.1.1 Jamshoro Power Company Limited (GENCO-I):

The installed capacity of GENCO-I power stations remained as 1,024 MW at the end of June 2018, showing no increase over that of 2017. The energy generated by GENCO-I during FY 2017-18 was 1,887 GWh, while, it was 3,592 GWh in FY 2016-17; a decrease of 1,705 GWh over last year. Net efficiency of GENCO-I during FY 2017-18 reduced to 27.46% for TPS Jamshoro and 25.19% for GTPS Kotri as compared to 28.42% and 27.06% respectively over the last year. With a capacity utilization of 32.25% for TPS Jamshoro and 8.07% for GTPS Kotri due to outages and various maintenance issues, the overall performance of GENCO-I was not satisfactory.

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1.3.1.2 Central Power Generation Company Limited (GENCO-II):

Total installed capacity of GENCO-II up to 30 June, 2018 has been noted as 2,402 MW (excluding 28 MW Thermal Power Station Quetta). No new generation plant was inducted during the year under review for GENCO-II. The energy generated by GENCO-II during FY 2017-18 has been recorded at 8,775 GWh, while, it was 8,132 GWh during FY 2016-17; an increase of 643 GWh.

GENCO-II faced problems due to maintenance issues, forced outages, fuel constraints and rehabilitation activities etc. With reduced annual efficiency and capacity with increased auxiliary consumption, the overall performance of GENCO-II remained unsatisfactory.

1.3.1.3 Northern Power Generation Company Limited (GENCO-III):

Total installed capacity of GENCO-III, up to 30 June, 2018 has been noted as 2,061 MW. During FY 2017-18, the installed capacity of GENCO-III decreased by 260 MW as compared with that of the year FY 2016-17, as the Authority decided to reject the request of NPGCL to grant extension in useful lives of Units No. 1-4 of the GTPS Faisalabad (operating in open cycle mode) and Unit No. 1-2 of SPS Faisalabad. The energy generated by GENCO-III during FY 2017-18 was 5,871 GWh, while it was 6,862 GWh during FY 2016-17; showing a decrease of 991 GWh compared with the last year, owing to various reasons.

It is observed that the overall net efficiencies of TPS Muzaffargarh, SPS Faisalabad, GTPS Faisalabad and Nandipur remained very low. Due to various maintenance issues, forced outages and fuel constraints etc. considerably low annual capacity utilization factors of 28.51%, 0.86%, 6.02% and 61.15% for TPS Muzaffargarh, SPS Faisalabad, GTPS Faisalabad and Nandipur Power Plants respectively have been reported. The overall performance of GENCO-III was not satisfactory.

1.3.1.4 Lakhra Power Generation Company Limited (GENCO-IV):

Total installed capacity of GENCO-IV, up to 30 June, 2018 has been noted as 150 MW. GENCO-IV has three units, each of 50 MW and during FY 2017-18 generated 3.39 GWh as compared to 124 GWh, produced during FY 2016-17.

It may be noted that, against the installed capacity of 150 MW, approximately, two third capacity of GENCO-IV is available for generation, which is also not being fully utilized due to forced outages etc. With utilization factor of 0.96% for FY 2017-18 the overall performance of GENCO-IV remained poor.

1.3.1.5 Nuclear (CHASNUPP-I, II, III & IV) and KANUPP:

During the FY 2017-18, owing to addition of CHASNUPP-IV, total installed capacity of Nuclear Power Plants connected with NTDC's system, is noted as 1,467 MW. The energy generated by Nuclear Power Plants during the FY 2017-18 stands at 9,051 GWh; an increase of 2,442 GWh over the energy during the FY 2016-17. The overall performance of Nuclear Power Plants connected with NTDC's system has remained satisfactory during the FY 2017-18 as no major outage is noted.

1.3.1.6 Hydropower:

The installed capacity of WAPDA Hydropower increased to 8,341 MW in FY 2017-18 as compared to 6,902 MW, recorded in FY 2016-17 owing to addition of 969 MW Neelum Jhelum HPP and one unit of Tarbela 4th Extension having capacity of 470 MW, whereas the 26,951 GWh generated in FY 2017-18 shows a decrease of 4,140 GWh from the last year due to several reasons. With regards to the Hydel IPPs, they contributed 130 GWh more energy in the system during FY 2017-18 as compared to FY 2016-17 owing to addition of 147 MW Patrind HPP and 8 MW Marala HPP. The hydropower production pattern over the year shows a downward trend as compared to the historical trends owing to seasonal variations and water flows. The availability and overall performance of major hydropower plants including Tarbela and Mangla remained satisfactory during the year FY 2017-18.

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1.3.2 Private Sector (Independent Power Producers):

Total installed capacities of thermal IPPs connected with NTDC system at the end of June, 2018 are noted as 15,297 MW; 4,731 MW higher as compared to FY 2016-17. The enhancement in capacity has been recorded due to induction of coal fired 1,320 MW Port Qasim Power Plant, second unit of coal fired 660 MW Sahiwal Power Plant, 1,276 MW RLNG fired Balloki Power Plant, 400 MW Steam Turbine of RLNG fired Bhikki Power Plant, one Gas Turbine and one Steam Turbine having cumulative capacity of 849 MW of Haveli Bahadur Shah Power Plant and RFO fired short-term IPPs, namely 97 MW Reshma and 84 MW Gulf Power Plants. The energy generated by thermal IPPs connected with NTDC system during the FY 2017-18 is noted as 63,099 GWh against 48,243 GWh during the FY 2016-17 showing an increase of 14,856 GWh.

1.4 TRANSMISSION SYSTEM

As of 30 June 2018, NTDC is maintaining 16 (sixteen) 500 kV grid stations with a transformation capacity of 20,850 MVA. There are 39 (thirty-nine) 500/220 kV transformers and 33 (thirty-three) 220/132 kV transformers installed at these grid stations. At 220 kV level there are 42 grid stations with a transformation capacity of 28,860 MVA. There are 150 (one hundred and fifty) 220/132 kV transformers installed at 220 kV grid stations.

Out of 39 transformers at 500/220 kV level, 21 transformers (53.85%) are loaded above 80% of their rated capacity. Similarly out of 150 transformers at 220/132 kV level, 84 are overloaded representing around 56% overloading in the system.

1.4.1 Outages on NTDC Transmission Lines (500 kV and 220 kV):

As reported by NTDC the number of planned and unplanned outages at 500 kV level in 2017-18 have decreased as compared to 2016-17, whereas the number of planned and unplanned outages at 220 kV level in 2017-18 have increased as compared to 2016-17. As for duration of outages, the total duration of planned outages increased in 2017-18 as compared to 2016-17, for both 500 kV and 220 kV levels. For unplanned or forced outages, the total duration also increased in 2017-18 as compared to 2016-17. Therefore, reliability levels deteriorated in the NTDC system in 2017-18:

Vear	Description	Planned	Outages	Forced Outages	
fear		500 kV	220 kV	500 kV	220 kV
	No. of Outages	653	1114	122	336
2016-17	Total Duration in Minutes	286623	498620	29463	141619
	Maximum Duration of any Single Outage (Min.)	16521	16313	3894	13854
	No. of Outages	633	1598	116	389
2017-18	Total Duration in Minutes	305750	717250	42358	236585
	Maximum Duration of any Single Outage (Min.)	23000	28557	5101	40436

Source: NTDC

1.4.2 Delays in Project Completion and other Constraints in Transmission System:

During FY 2017-18, the progress reports on ongoing power evacuation projects and development projects, submitted by NTDC, show that NTDC could not complete a number of projects as per their scheduled dates, therefore completion dates of such projects were extended. Failure to complete projects, results in not only cost over-runs but also in uneconomic power dispersal. NTDC while agreeing to delays in its planned projects, reported the following constraints, which hindered progress on certain projects:

(a) The transmission constraints in HESCO network have lead to generation curtailment of Wind Power Plants in the HESCO area resulting in heavy payment against Non-Project Missed Volume (NPMV). Against the 784 MW installed capacity of wind energy, approximately 485 MW could be evacuated while 299 MW remained as "Generation Curtailment" during high wind periods.

- (b) Transmission constraints in the 500 kV network in HUBCO-Port Qasim corridor were also noted during the FY 2017-18, which led to underutilization of these power plants.
- (c) Power quality and capacity issues were also noted at Chakdara, D.I.Khan, Bannu and Nowshehra areas in the Khyber Pukhtunkhwa province, throughout FY 2017-18. Similarly, there were overloading of transformers and congestion issues in the Punjab, Sindh and Balochistan Provinces at Lahore, Rawat, Gatti, Ludewala, Toba Tek Singh, Sammundri, Vehari, Rohri and Quetta.
- (d) At the time of writing this report, NTDC has however, reported that the following improvement schemes have been carried out during FY 2018-19 to overcome constraints in its transmission networks:
 - (i) Rehabilitations/Augmentation at 500 kV Port Qasim to NKI and Jamshoro circuits have been carried out in April 2019 to evacuate maximum power from Port Qasim Power Plant.
 - (ii) Energization of 220 kV Chakdara grid in September 2018, 220 kV D.I. Khan grid in February, 2019 and 220 kV Nowshehra grid in April, 2019 improved power supply position in various regions of PESCO.
 - (iii) In September 2018, 500 kV transmission line interconnection with existing Hub Jamshoro single circuit, provided evacuation of power from HUBCO power plant to National Grid.
 - (iv) At 500 kV level, in April 2019, augmentation of 500 kV Lahore grid and 500 kV Rawat grid relieved overloaded power transformers. Similarly, augmentation of 500 kV Tarbela grid and 500 kV Gatti grid in May 2019 also relieved overloaded power transformers.
 - (v) At 220 kV level, in January-March 2019, augmentation of 220 kV Toba Tek Singh grid, 220 kV Bannu grid and 220 kV Ludewala grid relieved overloaded power transformers. Similarly, in April 2019, augmentation of 220 kV Sammundri Faisalabad grid, 220 kV Vehari grid, 220 kV Rohri grid and 220 kV Quetta Industrial grid relieved overloaded power transformers.
 - (vi) Efforts have also been made to resolve the power curtailment issues from wind power plants located in Jhampir and Gharo wind clusters by replacing locally made disc insulators with imported disc insulators, which was expected to complete by June 2019 for a stable power evacuation from wind corridor.

1.5 DISTRIBUTION SYSTEM

1.5.1 <u>Overloading in DISCOs System:</u>

Power delivery through DISCOs' networks mainly depends on the adequacy of three major components including power transformers (mostly 132/11 kV transformers), 11 kV feeders and finally the distribution transformers. The following tables provide a comparison of overloaded components in all DISCOs for FY 2016-17 and FY 2017-18.

1.5.1.1 Loading Position of Power Transformers:

On an overall basis, overloading on power transformers has reduced to 23.01% in FY 2017-18 from 30.28% as in FY 2016-17. On DISCO-to-DISCO comparison, PESCO has more than 50% power transformers overloaded above 80%, followed by HESCO having more than 40% of transformers overloaded. TESCO, SEPCO and QESCO overloadings are found in the range of 30%-39% whereas MEPCO and GEPCO stood in the range of 20%-29%. FESCO showed considerable improvement in overloading position as it brought down overloading from more than 51% in 2016-17 to about 19% in 2017-18. IESCO also improved the loading position and showed only 0.81% of its power transformers loaded above 80% of their rated capacity. LESCO showed a slight improvement of 0.40% this year as compared to previous year:

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DISCO	Total No. of Power Transformers		Total No. of Over-Loaded Power Transformers (Above 80%)		Percentage of Total Over-Loaded Power Transformers (Above 80%)	
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18
PESCO	230	236	113	125	49.13	52.97
TESCO	36	38	14	14	38.89	36.84
IESCO	202	248	24	2	11.88	0.81
GEPCO	160	174	34	51	21.25	29.31
LESCO	351	390	14	14	3.99	3.59
FESCO	195	225	100	42	51.28	18.67
MEPCO	282	292	75	65	26.60	22.26
HESCO	119	121	59	49	49.58	40.50
SEPCO	118	126	53	49	44.92	38.89
QESCO	160	175	75	55	46.88	31.43
Total	1,853	2,025	561	466	30.28	23.01

Source: DISCOs

1.5.1.2 Loading Position of 11 kV Feeders:

On an overall basis, overloading on 11 kV feeders has also decreased as 23.49% of the total feeders are loaded above 80% compared to 29% last year. On individual DISCO level, PESCO, TESCO, SEPCO and QESCO have higher percentage of the overloaded feeders, followed by MEPCO, LESCO, FESCO and HESCO. IESCO on this account has lowest percentage of overloaded feeders:

DISCO	Total No. of 11 kV Feeders		Total No. of 11 kV Feeders	Over-Loaded s (Above 80%)	Percentage of Total Over-Loaded 11 kV Feeders (Above 80%)		
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18	
PESCO	946	1,012	485	412	51.27	40.71	
TESCO	199	207	199	207	100.00	100.00	
IESCO	1,058	1,068	27	25	2.55	2.34	
GEPCO	805	835	88	59	10.93	7.07	
LESCO	1,650	1,741	548	417	33.21	23.95	
FESCO	998	1,023	159	149	15.93	14.57	
MEPCO	1,241	1,324	433	373	34.89	28.17	
HESCO	479	502	121	69	25.26	13.75	
SEPCO	462	490	167	157	36.15	32.04	
QESCO	628	648	233	211	37.10	32.56	
Total	8,466	8,850	2,460	2,079	29.06	23.49	

Source: DISCOs

1.5.1.3 Loading Position of Distribution Transformers:

Overloading of distribution transformers has reduced from 12.49% in FY 2016-17 to 4.55% in FY 2017-18 as detailed below. Except for IESCO and GEPCO, other DISCOs have shown improvement in the overloading position of their distribution transformers:

DISCO	Total No. of Transf	Distribution ormers	Total No. of Distribution (Abov	Over-Loaded Transformers e 80%)	Percentage of Total Over-Loaded Distribution Transformers (Above 80%)		
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18	
PESCO	72,078	74,104	21,033	6,183	29.18	8.34	
TESCO	18,198	18,475			S/84		
IESCO	46,359	47,830	2,868	3,770	6.19	7.88	
GEPCO	61,661	64,344	1,475	1,741	2.39	2.71	
LESCO	100,718	105,185	30,350	2,950	30.13	2.80	

DISCO	Total No. of Distribution Transformers		Total No. of Distribution (Abov	Over-Loaded Transformers e 80%)	Percentage of Total Over-Loaded Distribution Transformers (Above 80%)		
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18	
FESCO	100,276	104,058	1,843	392	1.84	0.38	
MEPCO	156,460	161,197	8,128	5,844	5.19	3.63	
HESCO	35,996	36,670	3,340	532	9.28	1.45	
SEPCO	35,875	37,562	7,424	3,736	20.69	9.95	
QESCO	55,770	59,336	8,873	7,094	15.91	11.96	
Total	683,391	708,761	85,334	32,242	12.49	4.55	

Source: DISCOs

1.5.1.4 Province-wise Loading Positions:

Province-wise statistics of overloading position for FY 2017-18 is shown in the following table. Khyber Pakhtunkhwa viz-a-viz PESCO needs to focus on removing overloading of power transformers and 11 kV feeders as more than 50% of these are presently overloaded. This has become all the more important, as NTDC has reported elimination of all the bottlenecks and congestions on its 220 kV network linking Khyber Pakhtunkhwa, for smooth flow of power from generation facilities. Failure on PESCO's part to remove constraints on its network would adversely impact much needed sales growth:

Description	Punjab	Sindh	Khyber Pakhtunkhwa	Balochistan	Total
No. of 132 kV Grid Stations	518	124	91	69	802
Total No. of Power Transformers	1,329	247	274	175	2,025
Over-Loaded Power Transformers (Nos.)	174	98	139	55	466
Over-Loaded Power Transformers (%)	13.09	39.68	50.73	31.43	23.01
Total No. of 11 kV Feeders	5,991	992	1,219	648	8,850
Over-loaded 11 kV Feeders (Nos.)	1,023	226	619	211	2,079
Over-loaded 11 kV Feeders (%)	17.07	22.78	50.78	32.56	23.49
Total No. of Distribution Transformers	482,614	74,232	92,579	59,336	708,761
Over-loaded Distribution Transformers (Nos.)	14,697	4,268	6,183	7,094	32,242
Over-loaded Distribution Transformers (%)	3.04	5.75	6.68	11.96	4.55

Source: DISCOs

1.5.2 Transmission and Distribution Losses of DISCOs:

The following table gives actual T&D losses of DISCOs for FY 2017-18 and a comparison between the actual T&D losses (%) for two years i.e. FY 2016-17 and FY 2017-18:

DISCO	201	7-18 (Units in 0	GWh)		Losses (%)			
DISCO	Purchased	Sold	Lost	2016-17	2017-18	Inc./(Dec.)		
PESCO	14,213	8,796	5,417	32.60	38.11	5.51		
TESCO	1,693	1,482	211	15.40	12.46	-2.94		
IESCO	11,672	10,606	1,066	9.03	9.13	0.10		
GEPCO	10,987	9,887	1,100	10.23	10.01	-0.22		
LESCO	23,731	20,449	3,282	13.77	13.83	0.06		
FESCO	14,452	12,925	1,527	10.57	10.57	0.00		
MEPCO	19,006	15,853	3,153	16.91	16.59	-0.32		
HESCO	5,743	4,027	1,716	30.75	29.88	-0.87		
SEPCO	4,679	2,963	1,716	37.90	36.67	-1.23		
QESCO	6,338	4,916	1,422	23.08	22.44	-0.64		
Overall Average	112,514	91,904	20,610	17.95	18.32	0.37		

Source: PEPCO

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The T&D losses of DISCOs are among the most discussed and debated issues in the context of power sector. The Regulator has been also advising and directing the DISCOs for taking operational and managerial steps to control their losses and bring those, closer to prudent levels. It may be noted that as a whole, DISCOs' transmission and distribution losses, have increased than the last year. The largest increase in losses is observed in PESCO, whose losses increased by 5.5% in 2017-18 over those of 2016-17. DISCOs (LESCO, FESCO, MEPCO) with around 51% share in the power purchase, either had increase in their losses or maintained same level of losses as in 2016-17.

As discussed earlier, DISCOs need to improve their operational performance to take advantage of the improved electricity supply availability; otherwise, financial position of the power sector and the overall economy will have a huge negative impact. A report prepared by Implementation and Economic Reform Unit (IERU) with the Ministry of Finance noted that the loss of State Owned Enterprise (SOE) is mainly due to the loss booked by DISCOs and GENCOs. In the FY 2016, DISCOs booked a loss of Rs. 130.2 billion, whereas the public sector GENCOs booked a loss of Rs. 7.55 billion. The report pointed out that the profitability of DISCOs declined due to a pending Court Order between Ministry of Energy and NEPRA, which prevented notification of NEPRA tariff. Improvement in T&D losses can help DISCOs in reducing their financial losses. During FY 2017-18, seven DISCOs (excluding LESCO, SEPCO and TESCO) booked a total loss of Rs. 207.3 billion. These three DISCOs did not provide necessary data and reports.

NEPRA has also allowed huge investment funds every year to DISCOs, so that new and critical projects are initiated and completed on time. DISCOs have however, remained reluctant to undertake projects, which may bring improvements; metering at all levels to trace flow of electricity top-down and automatic metering and centralized monitoring. DISCOs have been noted to lack managerial capacity and skills, whereas they seem contended with their performance levels, and that approach at this crossroad, where the Federal Government has inducted a large generation capacity to the system, may drag the whole sector down. Since all DISCOs are owned and controlled by the Federal Government, therefore immediate corrective measures are needed. The Regulator has always been pointing out these factors to relevant quarters at all fora.

1.5.3 <u>Recovery Position of DISCOs (%):</u>

The following table provides a comparison of recovery percentages of all the DISCOs over last two years:

Year	PESCO	TESCO	IESCO	GEPCO	LESCO	FESCO	MEPCO	HESCO	SEPCO	QESCO	Overall DISCOs
2016-17	89.29	82.90	91.87	95.99	99.20	97.24	96.21	93.68	109.98	43.55	92.65
2017-18	88.60	66.61	89.75	96.07	95.93	97.93	94.58	75.41	59.72	25.01	87.71

Source: DISCOs

It is noted from above that in the province of Khyber Pakhtunkhwa, PESCO has shown reduction of 0.69% in its recovery position as compared to previous year whereas TESCO's recovery ratio has dropped by 16.29% as compared to the previous year.

Further, it may be seen that recovery ratios of IESCO, LESCO and MEPCO have deteriorated over the last year. Similarly HESCO, SEPCO and QESCO have seen drastic reductions in their recovery ratios. GEPCO and FESCO have shown slight improvement; however due to negative performance of invariably all other DISCOs, the overall recovery ratio has seen a dip of more than four percentage points. It is reiterated that higher T&D losses and low recovery ratios have effectively eroded the revenue beyond acceptable levels and no real effort or improvement have been observed despite regulatory directions to DISCOs and advisories to the executive body.

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1.5.3.1 Recovery Position of Main Categories of Consumers:

To narrow down the areas of interest, following table shows performance of all the DISCOs in the four major categories of consumers:

DISCO	Domestic	Commercial	Industrial	Agricultural							
PESCO	83.86	99.94	96.43	84.17							
TESCO	66.34	37.74	69.11	58.70							
IESCO	97.56	99.75	96.27	102.66							
GEPCO	98.75	100.00	95.83	99.55							
LESCO	98.26	98.64	93.88	86.09							
FESCO	99.05	99.80	95.94	97.36							
MEPCO	98.43	98.16	91.26	82.41							
HESCO	58.52	95.28	94.44	86.27							
SEPCO	35.65	98.20	86.26	68.69							
QESCO	46.93	94.34	93.30	11.79							

Recovery Position (%) of Main Categories of Consumers of DISCOs (2017-18)

The following observations are noted:

- (a) For PESCO, low recovery ratio of about 84% for Domestic and Agricultural consumers respectively, is noted whereas recovery percentages of 96% and about 100% for Industrial and Commercial consumers respectively are observed. TESCO reportedly faced law and order problems and showed about 66% average recovery ratio for the reporting period.
- (b) IESCO was able to recover above 96% of the billed amount from main consumer categories. GEPCO similar to IESCO has good recovery ratios from 96% to 100% for its Domestic, Commercial, Industrial and Agricultural consumers.
- (c) LESCO is able to recover approx. 94% to 98% of the billed amount from its Domestic, Commercial and Industrial consumers, whereas a relatively low recovery ratio of about 86% has been shown for Agricultural consumers.
- (d) FESCO showed a consistent trend of above 95% recovery from its all of its major consumer categories. MEPCO like FESCO also showed a better recovery position; from 90% to 100% during the reporting period.
- (e) HESCO was able to recover only 58% of the billed amount from its Domestic Consumers, which caused an overall low recovery ratio of 75% for FY 2017-18. Extra ordinary efforts are required by HESCO to improve its recovery position.
- (f) Like TESCO and HESCO, SEPCO is also facing high T&D losses in areas with very low recovery rates due to illegal hooks and running of disconnected and defaulter electricity connections. Due to these reasons, SEPCO's recovery position from its Domestic consumers reduced to 35% for an overall recovery percentage of 60%.
- (g) QESCO's recovery position was also very low. The main reason is non-payment of bills by the Agricultural Consumers who paid only 12% of the billed amount as noted above. Further, due to non-payment, QESCO recovered only 47% of the billed amount from Domestic Consumers.

In order to improve recovery ratios, DISCOs need to separate Industrial feeders from Residential and Commercial feeders. Encouragement of BPC would also help in improving overall recovery position of DISCOs.

1.5.4 Receivables of DISCOs:

The overall receivables of all the DISCOs have increased by Rs. 166.26 billion which are considerably higher than the receivables of Rs. 45.82 billion during FY 2016-17. As on June 30, 2018, the overall distribution sector receivables stood at Rs. 896.15 billion whereas, the receivables at the start of this financial year were Rs. 729.89 billion.

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During FY 2017-18, receivables from the Federal Government have increased by Rs. 2.32 billion over those of FY 2016-17. The receivables of DISCOs from the provincial governments of Punjab, Sindh and Balochistan have increased in this financial year, whereas the receivables from Khyber Pakhtunkhwa have slightly decreased. In addition, FATA receivables from domestic consumers have increased from Rs. 22.18 billion in FY 2016-17 to Rs. 26.85 billion in FY 2017-18. The receivables from KEL in FY 2017-18 have also increased by Rs. 18.33 billion. Therefore an overall governance issue is hurting DISCOs, where they are not able to recover their dues from the Federal and Provincial Governments as well as private consumers. Since DISCOs are centrally controlled by the Ministry of Energy (Power Division), therefore overall responsibility lies with the Federal Government for taking necessary steps for improvement in this area.

1.6 PERFORMANCE OF K-ELECTRIC LIMITED

The installed capacity of KEL's own generation fleet during FY 2017-18 has been noted as 2,294 MW, higher by 420 MW as compared to FY 2016-17, as Units 3 and 4 of BQPS-I having capacity of 210 MW each were added back to KEL's generation fleet from the generation licence of K-Energy. Since KEL is responsible for maintaining integrated systems of generation, transmission and distribution, therefore KEL is required to look for other sources to meet the supply and demand gap. Inability of KEL to effectively increase its generation capacity has made it dependent on external power sources, including the import from NTDC system. During FY 2017-18, in addition to purchasing power from IPPs/CPPs including Anoud Power, IIL, ISL, Tapal Energy, Gul Ahmed, KANUPP, FFBL Power and SNPCL, KEL also imported around 650 MW of power from NTDC on regular basis. It may be noted that the PPAs of KEL with Tapal Energy and Gul Ahmed are going to expire soon and KEL has requested NEPRA for further extension in the respective PPAs.

KEL generated 10,338 GWh during FY 2017-18 which is an increase of 191 GWh from the last year. Owing to reduction in own generation, KEL imported 2,450 GWh; an increase of 691 GWh from the last year. Operational trend of KEL own power plants shows that KEL consumed more furnace oil and less gas for electricity production during FY 2017-18 as compared to last year.

1.6.1 Loading Position of Power Transformers:

KEL has a total of 8 Grid Stations at 220/132 kV level, with 13 auto transformers of 3080 MVA transformation capacity, 63 Grid Stations at 132/11 kV level, with 147 power transformers with a transformation capacity of 5519 MVA. Operational record of 220/132 kV grid stations shows no overloading during the reported period of 2017-18 whereas, 32.65% of KEL's power transformers (i.e. 48 out of 147) at 132/11 kV level were found overloaded in the same time period.

1.6.2 Transmission Outage Statistics:

The following table provides a comparison of transmission outages for FY 2016-17 and FY 2017-18 as reported by KEL. It is noted that at 132 kV level, number of planned outages and total duration of outages in FY 2017-18 have decreased as compared to FY 2016-17 data, whereas the maximum duration of any single outage increased in the FY 2017-18 as compared to the FY 2016-17. As far as forced outages are concerned, it is noted that number of forced outages, total duration of outages and maximum duration of any single outage have decreased as compared to FY 2016-17 data:

Veer	Description	Planned	Outages	Forced Outages	
rear	Description	220 kV	132 kV	220 kV	132 kV
	No. of Outages	0	9	0	45
2016-17	Total Duration in Minutes	0	5271	0	8792
	Maximum Duration of any Single Outage (Min.)	0	1315	0	970
	No. of Outages	0	7	0	26
2017-18	Total Duration in Minutes	0	4855	0	2451
The state	Maximum Duration of any Single Outage (Min.)	0	2320	0	362

Source: KEL

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1.6.3 <u>Comparison of Loading Position of Different Components:</u>

The following table provides overloading position (above 80%) of different components in KEL for FY 2016-17 and FY 2017-18:

	2016-17	2017-18
Total No. of Over-Loaded 11 kV Feeders (above 80%)	91	29
Percentage of Total Over-Loaded 11 kV Feeders (above 80%)	5.51	1.68
Total No. of Over-Loaded Power Transformers (above 80%)	57	48
Percentage of Total Over-Loaded Power Transformers (above 80%)	41.30	32.65
Total No. of Over-Loaded Distribution Transformers (above 80%)	551	478
Percentage of Total Over-Loaded Distribution Transformers (above 80%)	2.15	1.75
Source: KEL	•	-

Source: KEL

KEL has shown marked improvements in overcoming the problem of overloading of 11 kV feeders, power transformers and distribution transformers. It has been able to reduce the number of overloaded feeders and transformers while at the same time it increased 11 kV feeders as well as power and distribution transformers. However further efforts are required for eliminating overloading, especially of power transformers.

1.6.4 <u>Recovery Position:</u>

The following table shows KEL's recovery position for different consumer categories. The overall recovery ratio of 91% has slightly improved over the last year ratio of 90%. The recovery position in domestic sector has also improved from 82% in FY 2016-17 to 84% in FY 2017-18, however considering the share of domestic sector (47%) in the overall billing, the recovery in domestic sector needs to be increased further:



	Recovery rostion of R Electric Elinited (2010-17 and 2017-10)											
	Amount of	Billed Units	Amount Realized and %age Recovery to Billed Amount									
Category	(Rs. in l	Million)	(Rs. in	Million)	(9	(%)						
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18						
Domestic	98,081	104,499	80,477	87,998	82.05	84.21						
Commercial	42,156	43,613	39,786	41,650	94.38	95.50						
Industrial	58,224	60,656	60,479	61,789	103.87	101.87						
Agricultural	1,419	1,296	351	343	24.74	26.47						
Public Lighting	3,482	2,809	1,045	1,066	30.01	37.95						
Bulk Supply	8,418	9,009	8,532	9,146	101.35	101.52						
Others	170	266	172	264	101.18	99.25						
Total	211,950	222,148	190,842	202,256	90.04	91.05						

Perovery Position of K-Electric Limited (2016-17 and 2017-18)

Source: KEL

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1.7 OTHER ISSUES OF POWER SECTOR

1.7.1 Conflicting Signals for the Sector:

Clear policies by the Federal Government and support by implementing agencies in a synchronized manner are key to the success of any sector. This is true particularly for power sector which is one of the most critical sectors; driving the economic health of the country. A number of power sector policies in the past provided unambiguous steps and other measures for incentivizing foreign investment in the country. The implementing agencies also provided total commitment to meet objectives of those policies. Over the past couple of years however, the organizations responsible for implementing government policies, failed to clearly support the stated policy objectives, specifically in the induction of renewable energy. The sector continued to receive conflicting signals leading to complete uncertainty and chaos for the stakeholders and investors alike. It was noted that the provincial governments appeared to be following a different approach relative to the position by one of the departments at the federal level. It is to be realized that once the investors' confidence is shaken, it also dilutes any such future effort, as the skeptical investors tend to stay away from any future initiatives. The Authority expects wholehearted ownership of the stated policies of the government by all the relevant agencies, to have positive far-reaching effects on setting the long-term direction of the sector.

The regulator also noted that statements on extremely important technical issues have been made depicting obvious lack of professional acumen. While such stance on some of the matters could be deliberate, it appeared to be more of a capacity issue as evident by statements of important agencies at different fora. It is to be understood that for the uplift of the power sector a thorough insight is to be developed for a coherent policy implementation.

1.7.2 Addition of Generation Capacity:

The Authority noted that a major debate was initiated about generation capacity surplus position in the NTDC system. It is argued that after the induction of more than 12,000 MW generation capacity in the system over last three years, there will be surplus capacity in the system than the forecasted electricity demand. The reports also refer to NEPRA State of Industry Report 2017, which indicated that the generation capability of NTDC system would be more than the projected peak demand. CPPA-G has officially taken a position that further renewable capacity additions in the system may not be entertained in view of such surplus. As a result, CPPA-G has been reluctant of further consideration of not only the conventional generation sources but also the addition of renewable energy facilities. It appears that the CPPA-G statements have not been based on thorough analysis and attention to prudent operation capability would be more than the peak demand forecast. A correct approach would be to analyze that such capacity availability would be enough to operate a system while satisfying internationally accepted reliability levels which require certain reserve capacity over and above the demand requirements. The projections for the present reporting period indicate that NTDC's system would be close to achieving acceptable levels by the year 2022, if new generation facilities are added as planned.

1.7.3 **Quality of Data Reporting:**

Further to above, quality of data is another factor, which impacts the overall working of the sector. A comparison of the data for the years 2017 and 2018 about demand and supply position reported by NTDC shows different conditions. Whereas data for the year 2017, projects more generation capability than demand even in 2019, the data about 2018 shows that a shortfall would be expected in the year 2019:

Surptus, Dentett (1117) til Dentalia and Suppty Reported by 111De									
Upto 30 th June	2019	2020	2021	2022	2023	2024	2025		
Based on Data reported in 2017	2,009	1,894	5,523	6,600	8,250	8,768	13,934		
Based on Data reported in 2018	-374	737	1,859	4,962	5,833	5,500	2,513		

Surplus/Deficit (MW) in Demand and Supply Reported by NTDC

The above comparison in fact corroborates that CPPA-G's position on the capacity surplus issue was not analyzed by it, thoroughly. In view of the sensitivity of the overall scenario, such unsubstantiated statements may be avoided.

1.7.4 **Development of a Power Market:**

Consistent with the objectives of the Federal Government, a market-based regime is foreseen for the power sector and CPPA-G through international consultants is currently working on proposals to develop competitive market model for the country. Competition in the market is expected to provide essentially the choice of suppliers of electricity and to bring the overall cost of electricity down to affordable levels for the end-consumers. Different market models are followed successfully in different countries and we can learn a lot from the experience of other countries. One of the fundamental requirements before evaluating any of the models is to understand the ground realities and readiness of the stakeholders. A model being practiced with a high degree of success in another country may not necessarily prove a panacea for Pakistani market. Being the regulator of sector, NEPRA is interacting with its licensees at different levels and it is felt that the required understanding among stakeholders is not there. In this respect the performance of public sector DISCOs alone, presents a fairly good account as to what can be expected from the sector if a market model is thrusted without creating necessary enabling conditions. After the unbundling exercise, pursuant to the 1992 reform process, DISCOs were expected to operate as independent entities; performing different tasks starting with planning, network studies, designing and implementation of distribution schemes and fully conversant and compliant with the Grid and Distribution Codes. However, the reality is that the DISCOs are not in a position to take decisions on network studies and other connectivity issues. Due to obvious lack of capacity issues, DISCOs have shown their inability to undertake construction activities of important 132 kV networks, whereas they have failed to have direct agreements with the generation companies due to same reasons and lack of understanding about the overall concept. DISCOs' mindset is obviously to remain in the background; however, their reluctance to adopt the change has resulted in increased centralization in the form of CPPA-G. NEPRA would not like that the centralized role is extended beyond what is genuinely needed. NEPRA therefore feels that any model for a market should satisfy the following minimum requirements:

- (a) It should be a home grown solution rather than duplication of models in other countries.
- (b) It has to be gradual, initiated at a very rudimentary level.
- (c) It should encourage decentralization while it should discourage continuation and extension of centralized role of CPPA-G.
- (d) It should allow and encourage all the entities to take the ownership according to their responsibilities under the overall framework.
- (e) DISCOs be made independent from PEPCO with members of BOD having professional background.

1.7.5 Performance of Public Sector Entities vs Private Sector:

As discussed in earlier sections, majority of the challenges faced by the power sector are linked to the below par performance of state owned entities. Power generation plants of GENCOs have significantly lower operating efficiencies relative to their design efficiencies, whereas power plants in the private sector (IPPs) have maintained same efficiency levels as originally approved. As a result of induction of IPPs over time, the ratio of installed capacity of thermal IPPs to GENCOs' capacity is currently almost 3 to 1. Therefore, generally speaking, participation of private sector has benefitted the generation sector as a whole. On the other hand, participation of private sector in the distribution functions is limited to KEL experience, which serves only 2.6 million consumers of Karachi compared to around 27 million consumers served by public sector DISCOs.

KEL, a vertically integrated utility was privatized in 2005. Subsequent to privatization, from 2009 till 2018, KEL has shown improved operational performance in its transmission and distribution sectors, whereas DISCOs

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showed deterioration or barely maintained their performance levels over the same period. Table below draws a comparison of improvements in distribution performance indicators between KEL and DISCOs:

Distribution KBIs		K-Electric		DISCOs		
Distribution KPIS	2009	2018	Change	2009	2018	Change
T&D Losses (%)	35.9	20.4	15.5	16.7	18.32	-1.62
AT&C Losses (%)	43.2	27.5	15.7	27.9	28.36	-0.46

Distribution KBIs		K-Electric		DISCOs		
Distribution KPIS	2011	2018	% Change	2011	2018	% Change
Safety Incidents (No.)	26	10	-61.5	21	16	-25.7
Fault Rate (Faults/km)	2.11	0.85	-59.7	1 – 68	2.87	
Average Daily Load Shedding (Hrs.)	2.00	1.26	-37.0	5.52	3.66	-33.7

KEL has significantly reduced its Transmission and Distribution (T&D) Losses as compared to DISCOs. Prior to 2009, KEL's T&D Losses of 35.9% were at par with HESCO's and SEPCO's T&D Losses. Through a combination of loss reduction projects and initiatives such as use of Aerial Bundled Cable (ABC), the company has mitigated these losses by 15.5% points to 20.4% in 2018; whereas, T&D Losses for HESCO and SEPCO by the end of 2018 continue to loom over the same range of 29.8% and 36.7%, respectively. Overall, DISCOs have experienced an increase of 1.62 percentage points in their T&D Losses, from 16.7% in 2009 to 18.32% in 2018. In terms of Aggregate Technical and Commercial (AT&C) Losses, KEL's AT&C Losses have reduced from 43.2% in 2009 to 27.5% in 2018 showing a decrease of 15.7% percentage points; while DISCOs' AT&C Losses have increased by 0.46% percentage points between 2009 and 2018.

KEL has been able achieve 9% growth in its consumer base from 2016 to 2017, while from 2017 to 2018 it achieved a 6.5% increase in its consumers. The DISCOs added 4.3% consumers from 2016 to 2017 while such increase was 5.6% from 2017 to 2018. It also reflects that since DISCOs are not able to increase their consumers; their energy base is not adequate to absorb incremental capacity costs due to addition of generation power plants in the system.

Therefore, it pertinent that the Federal Government explores the option of privatization of XW-DISCOs encouraging private investment, making them financially self-sufficient and thereby, reducing the burden on national exchequer.

1.7.6 National Electricity Policy and Plan:

Under the Amendment Act, 2018, the Federal Government will develop national electricity policy, which would be binding upon NEPRA to follow. Further, the Federal Government is also required to develop a number of "Rules and Guidelines" for smooth transition from the existing regulatory regime to the new one under the Amendment Act. The Policy on Renewable Energy has also expired on March 2018. Till the writing of this report, the Federal Government has not approved National Electricity Policy; consequently plans under the policy have also not been prepared. Similarly, the Federal Government has not yet announced its new Policy on renewable energy. Absence of these policies have added to uncertainty in the sector for all stakeholders and since NEPRA is now bound to follow National Electricity Policy, therefore any long term regulatory framework may not be finalized. The requirement on part of the government to make rules and guidelines pursuant to the Amendment Act are also needed so that the regulator may develop its regulations accordingly. As pointed out earlier that due deliberations on the Amendments were not done, therefore at this stage, it is critical that relevant Policies, Rules and Guidelines are in place as early as possible.

1.7.7 Import of Power:

The Federal Government had plans to import power from Central Asian States (CASA Project), which will provide hydel based energy from Kyrgyzstan and Tajikistan to Pakistan. The project requires NTDC to construct 100 km Transmission Line from the Pak-Afghan Boarder to Peshawar and a 1,300 MW convertor station at Peshawar. Roughly, the present tariff will be Rupees 15/kWh, which will increase after the addition of transmission and distribution losses for the end-consumer. Therefore, the Regulator observes that this will not be a cheap solution, as it will not help lower the overall energy mix cost of the country. Further, it may also be noted that the energy will not be available during the winter when there is acute shortage of fuel and hydro energy in the country is also at the minimum level. In view of the above, the Federal Government may consider revisiting the agreements.

1.8 INITIATIVES BY NEPRA FOR LOWERING SECTOR COSTS

1.8.1 <u>Rationalization of Generation Tariff Parameters:</u>

As part of its regulatory process, NEPRA has reviewed various tariff components for necessary changes needed therein. Main objective of this exercise is that the power sector tariffs are consistent and reflective of prevailing economic and financial circumstances.

After a comprehensive review and discussion with various stakeholders, the Authority has decided to revise certain benchmarks and ceilings to be allowed for tariff components of generation projects. For bringing transparency to the tariff determination process, NEPRA notified the guidelines namely "NEPRA (Benchmarks for Tariff Determination) Guidelines, 2018" on 19th of June, 2018:

Details of these guidelines are discussed in the subsequent Section of the Report. The following tariff components have been reviewed:

- (a) Relevance of market rates like KIBOR and LIBOR
- (b) Capital Structure
- (c) Return on Equity During Construction (ROEDC) and Interest During Construction (IDC)
- (d) Financing Charges
- (e) Insurance and
- (f) Treatment of Withholding Tax

1.8.2 Rate of Return Review:

NEPRA has decided to review the returns offered in the power sector and prepared a concept paper for determination of the rates of return for the power companies, which provided a basis for determining the IRR for various technologies, value chain of power sector i.e. generation, transmission and distribution and tariff regimes (cost plus, upfront). The basic objective is that the IRR now needs to effectively account for specific risk and return matrix and its adjustment for a particular technology. The consultative process has been started by the Authority on the following proposed returns:

Technology	Propos	ed Term	Current Return		
rechnology	US\$ (%)	US\$ (%) Eq. Rs. (%)		Eq. Rs. (%)	
THERMAL					
Imported Coal	12.50	15.67	17.00	20.30	
Imported Gas (RLNG)	13.25	16.44	15.00	18.24	
Local Gas	14.00	17.21	15.00	18.24	
Thar/Local Coal	14.00	17.21	18.00	21.33	
Bagasse	14.00	17.21	15.00	18.24	

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Technology	Propos	ed Term	Current Return		
rechnology	US\$ (%)	Eq. Rs. (%)	US\$ (%)	Eq. Rs. (%)	
RENEWABLE					
Solar/Wind	14.00	17.21	14.00	17.21	
Small Hydro (Take or Pay)	14.25	17.47	17.00	20.30	
Small Hydro (Take and Pay)	14.50	17.73	17.00	20.30	
Large Hydro (Take or Pay)	15.00	18.24	17.00	20.30	
Large Hydro (Take and Pay)	16.00	19.27	17.00	20.30	

1.9 CONCLUSIONS

- 1.9.1 Public Sector GENCOs are contributing to expensive energy production due to their inferior efficiencies. NEPRA has decided to not renew the licences of those power plants having worst performance levels.
- 1.9.2 Import of power from Central Asian States is not expected to lower the cost of energy mix while its energy supply may not be attractive for the system due to seasonality in the availability of power.
- 1.9.3 Inconsistent data reporting and quality issues of information by XW-DISCOs, NTDC and K-Electric have been noted in the important areas of their power supply and demand projections.
- 1.9.4 The Transmission Sector (NTDC system) has shown improvements to a certain extent as constraints specific to different areas have been removed, notably around Khyber Pakhtunkhwa and 500 kV links for Port Qasim Coal Power Plant. However, constraints for evacuation of wind energy from Jhampir corridor continued to be experienced. Similarly, power production from newly constructed Guddu Power Plant has to be curtailed due to transmission constraints.
- 1.9.5 Overloading of 500 kV and 220 kV transformers in NTDC system continued in 2017-18.
- 1.9.6 Right of way Issues and "Stay Orders" by courts have been noted for delays in timely completion of transmission line projects.
- 1.9.7 In the absence of National Electricity Policy and Plan and the Rules to be framed by the Federal Government, pursuant to NEPRA Amendment Act, 2018, clear goals for the sector are not available for the stakeholders to move forward. Similarly, transition from the existing regulatory regime to the competitive market may not be completed without National Electricity Policy and Plan and supporting Rules and Guidelines.
- 1.9.8 XW-DISCOs could not reduce their overall T&D losses, as the results over past five years show that their losses increased in the FY 2017-18 relative to the earlier years. Similar performance has been noted in the area of overall revenue recovery of DISCOs. The recovery ratio in FY 2017-18 has deteriorated compared to previous years.
- 1.9.9 Circular Debt continued to accumulate to around Rupees 1,000 billion due to inefficiencies of GENCOs, DISCOs' inability to achieve targets for T&D losses and recovery ratios as allowed by NEPRA and other governance issues like delay in tariff notification.
- 1.9.10 Continuation of centralized control of DISCOs and public sector GENCOs, has been noted as one of the main reasons, for not only the substandard performance of these entities, but also a major factor for accumulation of Circular Debt.

- 1.9.11 For the past couple of years CPPA-G's stance has been noted to be inconsistent with the longterm vision and stated policies of the Federal Government. The positions of provincial bodies and CPPA-G have also been quite opposite to each other. The state of affairs especially for the renewable energy based projects have created a chaos in the sector. Due to such inconsistent policies, more than 1,850 MW of renewable energy based applications are pending with NEPRA for final determinations. CPPA-G is treading a tight rope, as its conduct would lead to irreparable damage to the power sector over the long run.
- 1.9.12 For the development of a market model, CPPA-G appeared to have ignored the ground realities and readiness of stakeholders and need for enabling environment.
- 1.9.13 Governance issues have been noted in the performance of K-Electric. KEL failed to anticipate about impending gas depletion and to take any remedial measures in the absence of long-term gas supply agreement with SSGC.

1.10 RECOMMENDATIONS

- 1.10.1 In order to lower the costs of expensive energy mix, the Federal Government is expected to take early decision on the fate of inefficient GENCOs. The Regulator considers that inefficient power plants are needed to be retired on priority.
- 1.10.2 Federal Government may revisit the power import from Central Asian States in view of the higher tariffs and other requirements for constructing transmission network.
- 1.10.3 To reduce impact of idle capacity on the overall tariff, Federal Government is recommended to carryout thorough analysis of any requirement for the import of additional power by K-Electric from NTDC system. NEPRA considers that it will be in the interest of the overall system, as it will help improve the utilization of power plants, whereas it will also provide continuity of power supply to K-Electric consumers in the short to medium term.
- 1.10.4 Sales growth policies are to be vigorously pursued by bringing more consumers to the DISCOs' network and encouraging existing paying consumers through reliable power availability. Load-shedding policies must be targeted only to those who are not paying. Separation of feeders may be considered to isolate paying and non-paying areas. Regressive policies to impose load-shedding on larger areas would result in higher tariffs for the rest of the paying consumers.
- 1.10.5 XW-DISCOs, NTDC and K-Electric are urged to revamp their data reporting by including necessary quality checks and preferably ISO certification so that consistent and accurate information is provided to the regulator and other stakeholders.
- 1.10.6 NTDC must continue its work on the strengthening of its network so that constraints are removed expeditiously. Similarly, the overloading of its transformers should be addressed so that further hotspots are not introduced. Its planning and monitoring functions are expected to be alert to timely notify about such conditions.
- 1.10.7 In order to address litigation and "right of way" issues, special energy courts may be introduced in the country.

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- 1.10.8 The Regulator supports the efforts of the Federal Government for targeting the high loss 11 kV feeders for bringing down T&D losses in DISCOs. The approach needs to be extended to all DISCOs. Automatic Metering at different voltage level to track and account for electricity flow should also be initiated in all DISCOs as early as possible.
- 1.10.9 The existing setup, with PEPCO assuming central control, is not capable of delivering the necessary improvement in the system and controlling accumulation of Circular Debt. For arresting Circular Debt, the accounting measures only, would not be enough and structural changes are required to be taken. In this respect besides allowing due independence as foreseen under the 1992 power sector reform plan to GENCOs and DISCOs, total privatization or public-private model may be explored by the Federal Government.
- 1.10.10 CPPA-G is urged to align its position as per the policies and objectives of the Federal Government. Its response on all issues must reflect credibility with depiction of a responsible organization. Support of provincial bodies is also critical, therefore for the sake of smooth functioning, overall long-term objectives of the sector are to be kept in view.
- 1.10.11 CPPA-G is required to take into view ground realities, preparedness and capacity levels of the stakeholders for development of market model for the power sector. The model is recommended to be simple and a homegrown solution rather than duplication of models being practiced in other countries.

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PERFORMANCE OF GENERATION SECTOR

2.1 GENERAL

The total installed generation capacity of Pakistan as on 30th June 2018 stands at 36,010 MW, against 28,739 MW on 30th June 2017, recording an increase of 7,271 MW or 25.30% over the last year. The power plants connected with NTDC and KEL system, generated 133,615 GWh during FY 2017-18 as compared to 120,621 GWh units produced during FY 2016-17. During FY 2017-18, the major additions to the system included hydel, thermal, nuclear and renewable energy based power projects.

2.2 INSTALLED CAPACITY AND ELECTRICITY GENERATION

The following tables give additional details of source-wise installed capacity and electricity generation by power plants connected with NTDC and KEL system during FY 2016-17 and 2017-18:

Installed Capacity (MW)					Elec	tricity Gen	eration (GV	Vh)		
	Ac on 20 th lung	2017	2010	Varia	tion		2016 17	2017 19	Variation	
As on 50 June		2017	2010	Capacity	%		2010-17	2017-10	Energy	%
HYDEL						_				
WAPD	A Hydel	6,902	8,341	1,439	20.85		31,091	26,951	-4,140	-13.32
IPPs H	ydel	214	372	158	73.83		988	1,118	130	13.16
THERI	MAL					_				
GENCO	Os with PEPCO	5,897	5,637	-260	-4.41		18,710	16,184	-2,526	-13.5
KEL Ov	wn	1,874	2,294	420	22.41		10,147	10,338	191	1.88
IPPs	Connected with PEPCO	10,566	15,297	4,731	44.78		47,972	62,434	14,462	30.15
	Connected with KEL	252	366	114	45.24	1	1,531	1,900	369	24.1
SPPs/CPPs connected with PEPCO		340*	340	0	0		271	666	395	145.75
SPPs/CPPs connected with KEL		87	87	0	0		187	550	363	194.11
NUCL	EAR									
CHAS	NUPP (I, II, III & IV)	1,005	1,330	325	32.34		5,868	8,720	2,852	48.6
KANU	PP	137	137	0	0		410	331	-79	-19.27
IMPO	RT									
Import from Iran						496	555	59	11.9	
RENEWABLE ENERGY (WIND, SOLAR AND BAGASSE)										
RE Pov with P	ver Plants connected EPCO	1,465	1,809	344	23.48		2,950	3,869	919	31.15
Total of the	Installed Capacity Country	28,739	36,010	7,271	25.3		120,621	133,615	12,995	10.77

Source-wise Installed Capacity (MW) and Electricity Generation (GWh) by Type

* Not indicated in the State of Industry Report 2017 Source: NTDC/KEL

2.3 YEAR-WISE CAPACITY ADDITIONS UPTO 2024-25

The following table provides planned future additions as reported by NTDC. It is noted that the information provided by NTDC may not match with power supply and demand projections table discussed in earlier section for FY 2018-19. The data reported as part of demand and supply projections is more reliable for any reference:

No.	Name of Project	Agency	Fuel	Installed Cap. (MW)	Commissioning Date
	20	18-19	1		
1	Almoiz Industries Limited	AEDB	Baggase	36	December, 2018
2	Daral Khwar Hydropower Project	PEDO	Hydro	37	December, 2018
3	Engro Powergen Project (Unit-I)	PPIB	Dom. Coal	330	December, 2018
4	RLNG based power plant at Trimmu, Jhang (GT No. 1 & 2)	PPDB	Imp. LNG	800	December, 2018
5	Hub Power Company Limited (Unit-I)	PPIB	Imp. Coal	660	December, 2018
6	Chanar Energy Limited	AEDB	Baggase	22	December, 2018
7	Zorlu Enerji Elektrik Uretim A.S	PPDB	Solar	100	December, 2018
8	Shahtaj Sugar Mills Limited	AEDB	Baggase	32	January, 2019
9	Hunza Power (Pvt.) Limited	AEDB	Baggase	49.80	February, 2019
10	Etihad Power Generation Limited	AEDB	Baggase	74.40	February, 2019
11	Indus Energy Limited	AEDB	Baggase	31	April, 2019
12	Bahawalpur Energy Limited	AEDB	Baggase	31.20	April, 2019
13	Kashmir Power (Pvt.) Limited	AEDB	Baggase	40	April, 2019
14	Ittefaq Power (Pvt.) Limited	AEDB	Baggase	31.20	May, 2019
15	Engro Powergen Project at Thar (Unit-II)	PPIB	Dom. Coal	330	June, 2019
16	Zorlu Enerji Elektrik Uretim A.S	PPDB	Solar	100	June, 2019
1/	Zonergy Company Limited (CPEC Project)	PPDB	Solar	600	June, 2019
18	Koto Hydropower Project		Hydro	41	June, 2019
	Gener	ration Additio	n in 2018-19	3,345	
10	20		Imp Cool	660	August 2010
20	Hamza Sugar Mills Limited		Baggaso	30	September 2019
20	PVK Energy Limited		Baggase	25	September 2019
21	HSM Energy Limited		Baggase	25	September 2019
22	TAY Power Gen Limited		Baggase	30	September, 2019
24	Two Star Industries (Pvt.) Limited	AFDB	Baggase	48 90	September, 2019
25	Faran Power Limited	AFDB	Baggase	26.5	September, 2019
26	Mirpurkhas Energy Limited	AFDB	Baggase	26	September, 2019
27	Alliance Sugar Mills Limited	AEDB	Baggase	30	September, 2019
28	Sheikhoo Power Limited	AEDB	Baggase	30	September, 2019
29	Mehran Energy Limited	AEDB	Baggase	26.50	September, 2019
30	Sadiqabad Power (Pvt.) Limited	AEDB	Baggase	45	September, 2019
31	Gotki Power (Pvt.) Limited	AEDB	Baggase	45	September, 2019
32	Gulpur Poonch River	PPIB	Hydro	102	October, 2019
33	RLNG based power plant at Trimmu, Jhang (ST No. 1)	PPDB	Imp. LNG	463	November, 2019
34	Vestas Asia Pacific Wind Technology (Pvt.) Limited	PPDB	Wind	250	December, 2019
35	Zhenfa Pakistan New Energy Company Limited	PPDB	Solar	100	June, 2020
	Gener	ration Additio	n in 2019-20	1,964	
	20	20-21			
36	Solution De Energy	PPDB	Solar	100	July, 2020
37	Grange Holding Power Limited	PPIB	Imp. Coal	163	August, 2020
38	CWE & Welt Konnect	PPDB	Solar	50	August, 2020
39	Zorlu Enerji Elektrik Uretim A.S	PPDB	Solar	100	September, 2020
40	TBEA Xingiang Sunoasis Company Limited	PPDB	Solar	100	October, 2020
41	MCCT ENFI Consortium	PPDB	Waste to Energy	40	November, 2020
42	Gorkin Matiltan Hydropower Proiect	PEDO	Hydro	84	November, 2020
43	Karachi Coastal (Unit-I)	PAEC	Nuclear	1,100	November, 2020
44	Punjab Power Development Company Limited	PPDB	Biomass	20	December, 2020
45	Thar Energy Limited (HUBCO) Thar Block-II	PPIB	Dom. Coal	330	March, 2021
46	Thal NOVA , Thar Block-II	PPIB	Dom. Coal	330	March, 2021
47	Shanghai Electric Power Project (Unit-I)	PPIB	Dom. Coal	660	March, 2021
48	Lucky Electric Power Company Limited	PPIB	Dom. Coal	660	March, 2021

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No.	Name of Project	Agency	Fuel	Installed Cap. (MW)	Commissioning Date				
49	Keyal Khwar Hydropower Project	WAPDA	Hydro	128	June, 2021				
50	Luat Hydropower Project	AJK	Hydro	49	June, 2021				
51	Siddiqsons Energy Limited	PPIB	Dom. Coal	330	June, 2021				
	Gener	ation Additio	n in 2020-21	4,244					
	202	21-22							
52	Shanghai Electric Power Project (Unit-II)	PPIB	Dom. Coal	660	August, 2021				
53	TPS Jamshoro (Phase-I)	GENCO	Imp. Coal	660	September, 2021				
54	Karachi Coastal (Unit-II)	PAEC	Nuclear	1,100	September, 2021				
55	Lawi Hydropower Project	PEDO	Hydro	69	November, 2021				
56	Vestas Asia Pacific Wind Technology (Pvt.) Limited	PPDB	Wind	750	December, 2021				
57	Karot Hydropower Project	PPIB	Hydro	720	December, 2021				
58	Coal Based Power Plant at Gwadar	PPIB	Imp. Coal	300	December, 2021				
59	TPS Jamshoro (Phase-II)	GENCO	Imp. Coal	660	March, 2022				
60	CASA 1000	GoP	Import	1,000	June, 2022				
61	Dasu Hydropower Project	WAPDA	Hydro	2,160	June, 2022				
62	Jagran Hydropower Project –III	AJK	Hydro	35	June, 2022				
63	КАРСО	PPDB	Imp. Coal	660	June, 2022				
	Gener	ation Additio	n in 2021-22	8,774					
	202	22-23							
64	Huaneng Shandong Power Generation Company Limited (RYK)	PPDB	Imp. Coal	1,320	July, 2022				
65	Harighel-Majeedgala Hydropower Project	AJK	Hydro	40	December, 2022				
66	Oracle Coal Power Project	PPIB	Dom. Coal	1,320	December, 2022				
67	Suki Kinari Hydropower Project	PPIB	Hydro	870	December, 2022				
68	Chiniot Dam	WAPDA	Hydro	80	June, 2023				
69	Gumat Nar Hydropower Project	AJK	Hydro	49.50	June, 2023				
	Generation Addition in 2022-23 3,680								
	202	23-24							
70	Phander	WAPDA	Hydro	80	August, 2023				
71	Harpo	WAPDA	Hydro	35	December, 2023				
72	Mohmand Dam	WAPDA	Hydro	800	May, 2024				
73	Ashkot Hydropower Project	AJK	Hydro	300	June, 2024				
74	Tarbela 5 th Extension Project	WAPDA	Hydro	1,410	June, 2024				
75	Lower Spat Gah	WAPDA	Hydro	496	June, 2024				
76	Lower Palas Valley	WAPDA	Hydro	665	June, 2024				
	Gener	ation Additio	n in 2023-24	3,786					
	202	24-25	<u> </u>						
77	Azad Pattan Hydropower Project	PPIB	Hydro	701	June, 2025				
78	Basho Hydropower Project	WAPDA	Hydro	40	June, 2025				
79	Kohala Hydropower Project	AJK/PPIB	Hydro	1,124	June, 2025				
	Gener	ation Additio	n in 2024-2 <mark>5</mark>	1,865					
	Total Genera	ation Additio	n by 2024-25	27,658					

Note: Commissioning schedules of new power generation projects are based on information provided by PPIB, WAPDA Hydel, PAEC, PPDB, AEDB, PEDO and GENCOs.

2.4 HYDROPOWER

It may be noted that the installed capacity of WAPDA Hydropower increased to 8,341 MW in FY 2017-18 as compared to 6,902 MW, recorded in FY 2016-17 owing to addition of 969 MW Neelum Jhelum HPP and one unit of Tarbela 4th Extension having capacity of 470 MW, whereas the 26,951 GWh generated in FY 2017-18 shows a decrease of 4,140 GWh from the last year due to several reasons. With regards to the Hydel IPPs, they contributed 130 GWh more energy in the system during FY 2017-18 as compared to FY 2016-17 owing to addition of 147 MW Patrind HPP and 8 MW Marala Hydropower Project. The hydropower production pattern over the year shows a downward trend as compared to the historical trends owing to seasonal

variations and water flows. The availability and overall performance of major hydropower plants including Tarbela and Mangla remained satisfactory during the year FY 2017-18.

2.4.1 <u>Power Purchase Agreements/Energy Purchase Agreements:</u>

No PPA of any large or small hydropower projects was submitted to NEPRA for approval during the year.

2.4.2 <u>Competitive Bidding of Hydropower Projects:</u>

In FY 2017, NEPRA had approved the RFP of six hydropower projects submitted by PEDO, under the NEPRA Competitive Bidding Tariff (Approval Procedure) Regulations, 2014 (CBTR). Subsequently, the bidding under CBTR-2014 for these projects was successfully completed and the Authority notified two out of the six lowest successful bidders. These two projects were the first hydropower projects whose tariffs have been determined through competitive bidding in Khyber Pakhtunkhwa. The details of these two projects are given in the table below:

Project	Capacity (MW)	Location	Power Purchaser	Successful Bidder Notification Date	Approved Tariff(Rs./kWh)
ShigoKas	102	Dir	CPPA-G	February 19, 2018	8.2658
ArkariGol	99	Chitral	CPPA-G	June 21, 2018	8.2396

2.4.3 <u>Performance Monitoring of Hydropower Projects:</u>

The monitoring of different hydropower projects was carried out to check their performance according to the terms and conditions set in Licence, PPA, Tariff Determination and other relevant rules and regulations:

- (a) NEPRA has noted unsatisfactory performance of Malakand-III (81 MW), Jinnah (96 MW) and Khan Khwar (72 MW) Hydropower Plants. The sponsors and the power purchaser have been directed by NEPRA to improve the operation and maintenance of these plants.
- (b) The Authority has noted with concern that the hydropower projects being implemented in the private sector are not using sufficient local manpower and are discriminating in wages of foreign and local personnel in the management and construction of the projects. Hence, the sponsors of large hydropower projects were directed to ensure that at least 80% of local labour and 70% local managerial staff is employed during their construction and operation phase. They were also directed not to unduly discriminate in the wages being paid to foreign and local employees.
- (c) The Authority took notice of the inordinate delay in signing of PPAs by CPPA-G and PESCO of hydropower projects such as the 18 MW Pehur HPP and 17 MW Ranolia HPP, and issued explanation letters under the NEPRA regulatory regime to CPPA-G and PESCO.
- (d) Implementation of NEPRA's Upfront Tariff for small HPPs was also stalled by CPPA-G. Show Cause Notice was given by NEPRA to CPPA-G for discrimination in issuance of consent of power purchase to small HPPs.

2.5 OVERVIEW OF PUBLIC SECTOR GENCOS

2.5.1 Jamshoro Power Company Limited (GENCO-I):

There has been no increase in the installed capacity of 1,024 MW of GENCO-I Power Stations at the end of June 2018 over that of 2017. The energy generated by GENCO-I during FY 2017-18 was 1,887 GWh, while, it was 3,592 GWh in FY 2016-17; a decrease of 1,705 GWh over last year. Net efficiency of GENCO-I during FY 2017-18 reduced to 27.46% for TPS Jamshoro and 25.19% for GTPS Kotri as compared to 28.42% and 27.06% respectively over the last year. With a capacity utilization of 32.25% for TPS Jamshoro and 8.07% for GTPS

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Kotri due to outages and various maintenance issues, the overall performance of GENCO-I has not been satisfactory.

2.5.2 <u>Central Power Generation Company Limited (GENCO-II)</u>:

Total installed capacity of GENCO-II, up to 30th June, 2018 has been noted as 2,402 MW (excluding 28 MW TPS Quetta). No new generation plant was inducted during the year under review for GENCO-II. The energy generated by GENCO-II during FY 2017-18 has been recorded at 8,775 GWh, while, it was 8,132 GWh during FY 2016-17. The energy generated by GENCO-II during FY 2017-18, has increased by 643 GWh compared with that of the last year.

It is observed that various units of GENCO-II have been off-bar for several years due to maintenance issues, forced outages, fuel constraints and rehabilitation activities etc. and are not being fully utilized. With reduced annual efficiency and increased auxiliary consumption, the overall performance of GENCO-II has remained unsatisfactory.

2.5.3 Northern Power Generation Company Limited (GENCO-III):

Total installed capacity of GENCO-III, up to 30th June, 2018 has been noted as 2,061 MW. During FY 2017-18, the installed capacity of GENCO-III decreased by 260 MW as compared with that of the year FY 2016-17 owing to license modification. During the year under review the Authority decided to reject the request of NPGCL to grant extension in useful lives of Unit Nos. 1-4 of the GTPS Faisalabad (operating in open cycle mode) and Unit Nos. 1-2 of SPS Faisalabad. However, the Authority decided to extend the useful lives of the Unit Nos. 5-9 of GTPS Faisalabad (operating in combined cycle mode) till June 30, 2022. The energy generated by GENCO-III during FY 2017-18 was 5,871 GWh, while it was 6,862 GWh during FY 2016-17, showing a decrease of 991 GWh, compared with the last year owing to various reasons.

It is observed that the overall net efficiencies of TPS Muzaffargarh, SPS Faisalabad, GTPS Faisalabad and Nandipur remained very low. Due to various maintenance issues, forced outages and fuel constraints etc. considerably low annual capacity utilization factors of 28.51%, 0.86%, 6.02% and 61.15% for TPS Muzaffargarh, SPS Faisalabad, GTPS Faisalabad and Nandipur Power Plants respectively have been reported. The overall performance of GENCO-III was not satisfactory.

2.5.4 Lakhra Power Generation Company Limited (GENCO-IV):

Total installed capacity of GENCO-IV, up to June 30, 2018 has been noted as 150 MW. GENCO-IV had three units of 50 MW and during FY 2017-18 generated 3.39 GWh as compared to 124 GWh produced during FY 2016-17.

It may be noted that, against the installed capacity of 150 MW, approximately, two third capacity of GENCO-IV is available for generation, which is also not being fully utilized due to forced outages etc. With utilization factor of 0.96% for FY 2017-18 the overall performance of GENCO-IV was noted to be poor.

2.6 NUCLEAR (CHASNUPP-I, II, III & IV) AND KANUPP

During the FY 2017-18, owing to addition of CHASNUPP-IV, total installed capacity of Nuclear Power Plants connected with NTDC's system, is noted as 1,467 MW. The energy generated by Nuclear Power Plants during the FY 2017-18 stands at 9,051 GWh which is an increase of 2,442 GWh over the energy during the FY 2016-17. The overall performance of Nuclear Power Plants connected with NTDC's system has remained satisfactory during the FY 2017-18 as no major outage is noted.

2.7 INDEPENDENT POWER PRODUCERS (IPPS)

Total installed capacities of thermal IPPs connected with NTDC system at the end of June, 2018 are noted as 15,297 MW; 4,731 MW higher as compared to FY 2016-17. The enhancement in capacity has been recorded

owing to induction of coal fired 1320 MW Port Qasim Power Plant, second unit of coal fired 660 MW Sahiwal Power Plant, 1276 MW RLNG fired Balloki Power Plant, 400 MW steam turbine of RLNG fired Bhikki Power Plant, one GT and one steam turbine having cumulative capacity of 849 MW in respect of Haveli Bahadur Shah Power Plant and RFO fired short term IPPs namely 97 MW Reshma Power and 84 MW Gulf Power Plants. The energy generated by thermal IPPs connected with NTDC system during the FY 2017-18 is noted as 63,099 GWh against 48,243 GWh during the FY 2016-17 showing an increase of 14,856 GWh.

2.8 RENEWABLES

2.8.1 <u>Wind:</u>

During FY 2017-18, 280 MW of wind power has been added to the NTDC's system, for a total wind based power of about 1,078 MW in the system. The energy generated by wind based power plants during FY 2017-18 has been noted as 2,140 GWh; increase of 293 GWh over the last year. The additions of wind power capacity include 30 MW Tapal Wind Energy, 50 MW Artistic Wind Power, 50 MW Hawa Energy, 50 MW Jhampir Power, 50 MW Three Gorges Second Wind Farm and 50 MW Three Gorges Third Wind Farm.

2.8.2 <u>Solar:</u>

During FY 2017-18, two solar energy projects have been added to NTDC's network. The total energy through solar has been recorded at 669 GWh for an increase of 34 GWh over the energy generated through solar during FY 2016-17. The two new projects are 12 MW AJ Power and 18 MW Harappa Solar.

2.8.3 Bagasse:

During FY 2017-18, there is an increase of about 20 MW in the installed generation capacity of bagasse based power plants for a total of about 301 MW in the NTDC's system. The new addition is 20 MW Thal Industries Corporation. The energy generated by bagasse based power plants during FY 2017-18 has been noted as 1,060 GWh.

2.8.4 Bagasse/Coal:

During FY 2017-18, a bagasse/coal fired project namely Fatima Energy Limited generated 21 GWh.

2.9 K-ELECTRIC LIMITED

The installed capacity of KEL's own generation fleet during FY 2017-18 has been noted as 2,294 MW, higher by 420 MW as compared to FY 2016-17 as Units 3 and 4 of BQPS-I having capacity of 210 MW each were added back to KEL's generation fleet from the generation licence of K-Energy. Since KEL is responsible for maintaining integrated systems of generation, transmission and distribution, therefore KEL is required to look for other sources to meet the supply and demand gap. Inability of KEL to effectively increase its generation capacity has made it dependent on external power sources, including the import from NTDC system. During FY 2017-18, in addition to purchasing power from IPPs/CPPs including Anoud Power, International Steel Limited, Tapal Energy, Gul Ahmed, KANUPP, International Industries Limited, FFBL Power and SNPCL, KEL also imported around 650 MW of power from NTDC on regular basis.

KEL generated 10,338 GWh during FY 2017-18 which is an increase of 191 GWh over the last year. Owing to reduction in own generation, KEL imported 2,450 GWh; an increase of 691 GWh over the last year. Operational trend of KEL own power plants shows that KEL consumed more furnace oil and less gas for electricity production during FY 2017-18 as compared to last year.

2.10 ELECTRICITY PURCHASES FROM SPPS/CPPS/N-CPPS

During the FY 2017-18, the surplus installed capacity available with Sugar Mills and Textile Mills etc. was utilized by different DISCOs as shown in the following table:

CPP/SPP/NCPP	DISCO	Туре	Fuel	Contract Cap. (MW) (2018)	Energy (kWh) (2016-17)	Energy (kWh) (2017-18)
Sitara Energy	FESCO	SPP	RFO	25	-	-
Galaxy Textile	FESCO	N-CPP	Gas	11.6	-	-
Shakarganj Energy	FESCO	CPP	Bagasse	6	-	-
Shakarganj Sugar Mills	FESCO	CPP	Bagasse	2	1,159,899	19
Ramzan Sugar Mills	FESCO	CPP	Bagasse	12	-	-
Noon Sugar Mills	FESCO	CPP	Bagasse	12	399,550	3,319,755
Bhone Sugar Mills	FESCO	CPP	Bagasse	1	1,436	338
Indus Sugar Mills	MEPCO	CPP	Bagasse	4	5,333,032	80
Ashraf Sugar Mills	MEPCO	CPP	Bagasse	3	13,045,680	-
Jamal Din Wali Sugar Mills	MEPCO	CPP	Bagasse	10	15,515,490	-
Hamza Sugar Mills	MEPCO	CPP	Bagasse	2.5	5,570,592	-
Roomi Fabrics	MEPCO	CPP	Gas	5	783,480	-
Roomi Fabrics	MEPCO	N-CPP	Gas	10.5	166,420	-
Rahimyar Khan Sugar Mills	MEPCO	CPP	Bagasse	8.5	-	-
Thal Industries	MEPCO	CPP	Bagasse	4	36	-
Thatta Power	HESCO	N-CPP	Gas	18.8	13,189,500	74,700,050
Anoud Textile	HESCO	N-CPP	Gas	10	812,432	1,668,448
Agar Textile Mills	HESCO	CPP	Gas	2	63,695,536	91,768,512
Faran Sugar Mills	HESCO	CPP	Bagasse	5	4,315,488	4,099,736
Omni Power	HESCO	N-CPP	Gas	10	10,250,672	65,460,492
Omni 1	HESCO	N-CPP	Gas	10	-	2,626,136
Omni 2	HESCO	N-CPP	Gas	10	-	2,590,984
Chamber Sugar Mills	HESCO	CPP	Bagasse	1.5	1,718,364	1,413,390
Sanghar Sugar Mills	HESCO	CPP	Bagasse	3.4	5,381,392	4,010,000
Bandhi Sugar Mills	HESCO	CPP	Bagasse	10	7,853,232	6,066,296
Salim Yarn Mills	HESCO	CPP	Gas	2	-	-
Mekotex	HESCO	CPP	Gas	4	-	-
Hi-Tech Pipe & Engineering	HESCO	CPP	Gas	8	12,199,216	5,045,840
Mehran Sugar Mills	HESCO	CPP	Bagasse	2	3,448,320	2,650,104
TAY Sugar Mills	HESCO	CPP	Bagasse	9	9,069,240	8,733,108
Lucky Cement	HESCO	N-CPP	Gas	20	47,845,440	159,596,640
Al Noor Sugar Mills	SEPCO	CPP	Bagasse	8	13,565,880	11,531,920
Dharaki Sugar Mills	SEPCO	CPP	Bagasse	4	-	-
Ghotki Sugar Mills	SEPCO	CPP	Bagasse	8	-	-
Dadu Energy	SEPCO	N-CPP	Gas	19.2	5,894,700	103,693,200
Naudero Energy	SEPCO	N-CPP	Gas	15.8	-	-
Lodhra Power	SEPCO	N-CPP	Gas	16	5,871,800	103,536,500
Brothers Sugar Mills	LESCO	CPP	Bagasse	3	-	-
Layyah Sugar Mills	-	CPP	-	4	22,414,656	-
Kumhar Wala Powerhouse-I	-	CPP	-	5	1,641,720	7,306,800
Kumhar Wala Powerhouse-II	-	CPP	-	10.5	257,520	2,392,080
Habib Sugar Mills	HESCO	CPP	Bagasse	3.4	-	3,318,474
			Total	339.7	271,400,723	655,528,902

Source: CPPA-G

2.11 OPERATIONAL PERFORMANCE OF GENERATION FACILITIES

The performance of generation power plants may be gauged through analyzing a number of parameters including their unit-wise and complex based availability. NEPRA has also prescribed generation performance standards, which include Key Performance Indicators (KPIs) for evaluation of performance. The performance of generation power plants with respect to their design parameters has been discussed in earlier sections, whereas their operational performance is discussed in the following sections.

2.11.1 Availability of GENCOs' Power Plants:

The availability factor of a power plant is the amount of time, during which, the plant is able to produce electricity over a certain period, divided by the amount of time in the period. The availability of a power plant varies greatly, due to the type of fuel, design of the plant and how the plant is operated:

2.11.1.1 Unit-wise Availability Factors:

Unit-wise Availability Factors (AFs) of GENCOs' power plants during the period under review are shown in the following tables:

TPS Jamshoro		
Unit Availability Factor (%		
Unit-1	86.63	
Unit-2	84.95	
Unit-3	89.45	
Unit-4	80.09	

TPS Guddu		
Unit Availability Factor (%)		
Block-III (Unit 3-4)	98.78	
Block-II (Unit 5-10)	91.79	
Block-I (Unit 11-13)	69.13	
Block-V (Unit 14-16)	76.06	

GTPS Faisalabad		
Unit	Availability Factor (%)	
Unit-1	100.00	
Unit-2	100.00	
Unit-3	100.00	
Unit-4	87.78	
Unit-5	97.93	
Unit-6	94.77	
Unit-7	99.55	
Unit-8	98.73	
Unit-9	98.80	

TPS Kotri			
Unit Availability Factor (%)			
Unit-3	79.62		
Unit-4	94.51		
Unit-5	92.72		
Unit-6	99.83		
Unit-7	96.27		

TPS Muzaffargarh			
Unit	Availability Factor (%)		
Unit-1	90.08		
Unit-2	90.32		
Unit-3	91.12		
Unit-4	88.82		
Unit-5	78.13		
Unit-6	81.21		

Lakhra FBC			
Unit Availability Factor (%)			
Unit-1	0.68		
Unit-2	1.62		

Nandipur CCPP		
Unit Availability Factor (%)		
Unit-1-4 88.44		

2.11.1.2 Plant-wise Availability Factors (%):

On an overall plant basis a comparison of AFs for FY 2016-17 and FY 2017-18 is shown in the accompanying table. Mostly the AFs for the two years are similar, however for Lakhra an already poor AF in 2016-17 has drastically reduced to 5% in FY 2017-18, pointing to serious issues in the power complex, also discussed in earlier sections. It is also pertinent to mention here that although, the AFs of GTPS Kotri, GTPS and SPS Faisalabad seem within the acceptable range, but most of the time, these power stations remained on standby mode due to which their potential was not utilized.

Power Station	2016-17	2017-18
TPS Jamshoro	82	85
GTPS Kotri	94	93
TPS Guddu (1-13)	58	61
TPS Guddu (14-16)	87	75
TPS Muzaffargarh	86	87
GTPS Faisalabad	96	98
SPS Faisalabad	48	45
CCPP Nandipur	55	93
Lakhra FBC	24	5

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2.11.2 <u>Performance of Generation Facilities under NEPRA Performance Standards (Generation)</u> <u>Rules, 2009:</u>

NEPRA Performance Standards (Generation) Rules 2009, specify a number of Key Performance Indicators (KPIs) which relate plant operational parameters to gauge performance of generation licensees, who are required under the rules to submit their performance reports to NEPRA. Of these, the major ones are defined hereunder:

The first such parameter is Net Capacity Factor (NCF) which works out the actual energy produced by a unit/ machine during a particular period compared to its full potential for power generation during that period. Net Output Factor (NOF) is the second indicator, which measures the actual energy over the time when the units/machines were actually synchronized with the system. Energy Availability Factor (EAF) calculates the amount of time in which a unit/machine practically remained available less any equivalent planned/ unplanned de-rated hours, for generation of power at full net capacity. Another parameter which is commonly used in NTDC system is the "Standby Mode", which is the period when machine is available for generation but not actively utilized either due to fuel constraints or less demand, on the instruction of System Operator or otherwise. It is to be noted that a collective analysis of these KPI would lead to drawing conclusions about the performance of power plants. The following sections provide data about these KPIs for power plants controlled by GENCOs:

2.11.2.1 Net Capacity Factor (NCF) (%):

On an average, the NCF for all the power plants remained very low in FY 2017-18. A comparison with FY 2016-17 shows that except for TPS Guddu (1-13) which has slightly higher NCF in FY 2017-18 and CCPP Nandipur, other power plants had lower factors. The data shows that most of the time, these power stations remained either on standby mode or on planned/ unplanned outage mode during the subject period. Therefore, relative to the previous year the performance on this account has deteriorated.

2.11.2.2 Net Output Factor (NOF) (%):

On an average, the NOF of all the power plants varied between 65% to 87%. A factor above 95% shows that generally the power plant was operated in a prudent manner as it produced 95% of the time, the energy it could have produced. Based on the given data the performance of GENCOs was not at par with better performing power plants.

Power Station	2016-17	2017-18
TPS Jamshoro	57	32
GTPS Kotri	37	10
TPS Guddu (1-13)	28	34
TPS Guddu (14-16)	67	59
TPS Muzaffargarh	53	29
GTPS Faisalabad	11	6
SPS Faisalabad	15	1
CCPP Nandipur	40	61
Lakhra FBC	16	5

Power Station	2016-17	2017-18
TPS Jamshoro	80	71
GTPS Kotri	83	76
TPS Guddu (1-13)	75	65
TPS Guddu (14-16)	78	79
TPS Muzaffargarh	76	68
GTPS Faisalabad	82	84
SPS Faisalabad	85	87
CCPP Nandipur	74	73
Lakhra FBC	66	108

2.11.2.3 Energy Availability Factor (EAF):

EAFs as shown in the accompanying table and AFs discussed earlier have been noted to differ for TPS Jamshoro, TPS Guddu, TPS Muzaffargarh and CCPP Nandipur, implying that their net capacities were temporarily reduced due to equivalent planned and unplanned de-ratings during the reported period.

Power Station	2016-17	2017-18
TPS Jamshoro	58	64
GTPS Kotri	94	93
TPS Guddu (1-13)	57	58
TPS Guddu (14-16)	87	75
TPS Muzaffargarh	62	62
GTPS Faisalabad	95	97
SPS Faisalabad	47	45
CCPP Nandipur	45	56
Lakhra FBC	24	5

2.12 PERFORMANCE EVALUATION REPORT OF GENCOS

The quarterly reports submitted by public sector GENCOs for the FY 2014-15 and FY 2015-16 were reviewed and a comprehensive Performance Evaluation Report (PER) was prepared and uploaded on NEPRA website. The report mainly highlights that the units/machines of different power stations of GENCO-I, II and III consumed excess auxiliary power during service mode than allowed limit as specified in their respective generation license, resulting in an energy loss of around 668 million kWh which translates into a financial impact of Rs. 7.49 Billion.

The report also highlights that certain gas-based power stations such as GTPS Kotri and GTPS and SPS Faisalabad remained on standby mode for most part during the FY 2014-15 and 2015-16, thereby, squandering the potential to generate significant amount of economically efficient energy. On top of that, the units/machines of GENCO-I, II and III have drawn around 382 million kWh energy during standby mode under the head of auxiliary power consumption. In addition to this, the units/machines of different power stations of GENCO-I, II and III availed higher outage hours than allowed limit as prescribed in their respective PPAs, resulting in non-compliance of the Grid Code, 2005.

2.12.1 Legal Proceedings against GENCO-I, II and III:

NEPRA has initiated legal proceedings against GENCO-I, II and III on account of excess auxiliary consumption during service mode than allowed limit as specified in their respective generation license and availing higher outages than allowed limit as prescribed in their respective PPAs, during the FY 2014-15 and FY 2015-16. The same are currently under process.

2.13 ISSUES RELATED TO K-ELECTRIC

2.13.1 Gas Supply Issue to K-Electric:

K-Electric had to resort to unscheduled load-shedding in April 2018 due to curtailment of gas supply by SSGC to KEL. It may be noted that KEL was receiving around 50 to 60 MMCFD less gas as compared to FY 2016-17 and the situation worsened as KEL was experiencing more demand this year, than last year due to early onset of summer. The Authority noted that gas curtailment added to the problems in KEL area; however, the situation aggravated as KEL did not have any arrangement to operate its power plants on alternative fuel (HSD). It was found that although infrastructure for HSD supply was available at both the gas turbine based power plants of KCCPP and BQPS-II, the possibility of operation on HSD was not integrated in the software control as reported by KEL.

In the absence of gas supply agreement, SSGC was not ready to make any firm commitments for the longterm supply of gas to KEL. It was only on to the intervention of the Federal Government, for the continuity of supply to KEL consumers that SSGC agreed to resume supply, on availability of gas basis. The situation calls for KEL to take concrete steps for continuity and assurance of supply of fuel. With gradual depletion of

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indigenous gas, KEL in addition to having GSA with SSGC, must also go for agreements based on RLNG through dedicated pipeline.

For continuity of supply for such eventualities, KEL might also like to negotiate for more power imports from NTDC system. This would also be beneficial for NTDC as it is forced to underutilize generation facilities in its system due to transmission and distribution system constraints. Selling to KEL would also neutralize high costs due to reportedly unused surplus capacity in the system.

2.13.2 K-Electric Governance Issues:

The unscheduled load-shedding as a result of curtailment of gas by SSGC to KEL system points to a number of governance issues. First KEL did not make any efforts to commission its power plants on HSD operation as an alternative supply arrangement, whereas further analysis showed that KEL and SSGC did not have any gas supply agreement. As a prudent utility KEL should have commissioned its dual fuel options and the responsibility lies with KEL that it had not made necessary arrangements including necessary agreement to meet such eventualities.

Consistency of data is also not ensured by KEL in reporting its supply and demand projections. Earlier, as part of its submissions for State of Industry Report 2018, it reported power supply deficit only in 2020, while for subsequent years up to 2023, it reported that supply would be more than demand at peak times. In a subsequent presentation however, KEL reported a deficit position throughout from 2020 to 2023. The forecasted demand also shows variations in the data. Accuracy of data is critical for any utility and it may lead to inconsistent decisions and shows non-serious attitude of the management on important matters:

30 th June	2020	2021	2022	2023
Demand Projections Reported for State of Industry (MW)	4,087	4,376	4,668	4,952
Power Surplus/Deficit Reported for State of Industry (MW)	-726	262	688	404
Demand Projections Reported in June, 2019 (MW)	3,792	4,066	4,378	4,750
Power Surplus/deficit Reported in June, 2019 (MW)	-461	-665	-71	-453

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PERFORMANCE OF TRANSMISSION SECTOR

3.1 GENERAL

The transmission line network of NTDC includes 5,772 km long transmission lines operating at 500 kV level and 10,753 km long 220 kV lines. As of 30th June 2018, NTDC is maintaining 16 (sixteen) 500 kV grid stations with a transformation capacity of 20,850 MVA. There are 39 (thirty nine) 500/220 kV transformers and 33 (thirty three) 220/132 kV transformers installed at these grid stations. At 220 kV level there are 42 grid stations with a transformation capacity of 28,860 MVA. There are a total of 117 (one hundred and seventeen) 220/132 kV transformers installed at 220 kV grid stations.

In addition to transmission lines of NTDC, a 37 km long 132 kV D/C transmission line has been energized in 2016 by Fatima Transmission Company Limited. A 95 km long 132 kV D/C transmission line of Sindh Transmission and Dispatch Company Limited (STDC) has achieved its COD in January, 2018. The construction activities on 878 km long HVDC bi-pole transmission line operating at ±660 kV have been initiated.

POWER BALANCES OF NTDC SYSTEM 3.2

The following table provides peak time demand of NTDC system, year-wise capacity additions up to the year 2025 and surplus/deficit statistics. It may be noted that a supply surplus scenario is expected in the FY 2019-20:

	Sulptus Denett in Demand and Supply during NTDC's System Feak Hou							
Year	Installed	Planned Generation	NTDC's Projected	NTDC's Projected	Surplus/			
endina	Capacity (NTDC	Capability as per	Demand Growth	Demand during	Deficit			
30 th June	System) (MW)	NTDC (MW)	Rate (%)	Peak Hours (MW)*	(MW)			
2019	35,870	26,887	3.90	27,261	-374			
2020	37,834	28,892	4.10	28,155	737			
2021	42,078	31,184	3.80	29,325	1,859			
2022	50,852	35,883	3.90	30,921	4,962			
2023	54,532	37,786	3.90	31,953	5,833			
2024	58,318	39,196	3.80	33,696	5,500			
2025	60,183	37,935	3.90	35,422	2,513			

* NTDC develops the Demand Projections of Peak Demand only.

• Electricity Demand Forecast based on Regression Report (Period 2018-2040)

• Summary of Power Balance based on latest IGCEP 29 October, 2018 Source: NTDC

LOADING POSITION OF NTDC'S 500 KV AND 220 KV GRID STATIONS 3.3

As of June 30, 2018, there are 16 (sixteen) 500 kV Grid Stations with 39 transformers at 500/220 kV level. Out of these, 21 transformers (53.85%) are loaded above 80% of their rated capacity. Similarly, there are 150 (one hundred and fifty) 220/132 kV transformers (including transformers installed at 500 kV grid stations). Of these, 84 transformers are overloaded representing around 56% overloading in the system. The following tables show loading position of power transformers loaded above 80% of their rated capacity installed at 500 kV and 220 kV grid stations of NTDC:



Α.	Overloading	of 500 k	V and	220 kV	Power	Transformers	installed	at 500	kV Gri	d Stations	(as of
June,	2018):										

Pagion	Name of	Auto and	Voltage	Capacity	Capacity	Load	Overload
Region	Grid Station	Power T/F	Level	(MVA)	(Ampere)	(Ampere)	(above 80%)
		T-1	500/220	450	1125	1060	94.22
		T-2	500/220	450	1125	1060	94.22
	Powat	T-3	500/220	450	1125	1060	94.22
	Rawat	T-4	220/132	250	1093	1020	93.32
75		T-5	220/132	250	1093	1020	93.32
bac		T-6	220/132	250	1093	1020	93.32
па		T-1	500/220	450	1180	990	83.90
slaı		T-2	500/220	450	1180	990	83.90
—	Chailth	T-3	220/132	250	1093	980	89.66
	Muhammadi	T-4	220/132	250	1093	980	89.66
	Pullaminaut	T-5	220/132	250	1093	980	89.66
		T-8	220/132	250	1093	980	89.66
		T-9	500/220	450	1180	990	83.90
		T-1	500/220	600	1575	1530	97.14
		T-2	500/220	600	1575	1530	97.14
	Nokhar	T-4	220/132	160	700	650	92.86
		T-5	220/132	160	700	650	92.86
		T-6	220/132	160	700	650	92.86
		T-1	500/220	450	1181	1129	95.60
	Gatti	T-2	500/220	450	1181	1153	97.63
		T-3	500/220	450	1181	1104	93.48
		T-4	500/220	450	1181	1104	93.48
		TB-1	500/220	600	1575	1570	99.68
le		TB-2	500/220	600	1575	1570	99.68
aho		TB-3	500/220	600	1575	1570	99.68
Ľ	Sheikhunura	TB-4	500/220	600	1575	1570	99.68
	Sheikhapara	T-5	220/132	160	700	575	82.14
		T-6	220/132	160	700	640	91.43
		T-7	220/131	160	700	690	98.57
		T-8	220/132	160	700	565	80.71
		T-1	500/220	600	1575	1530	97.14
		T-2	500/220	600	1575	1530	97.14
	Yousafwala	T-3	220/132	160	700	610	87.14
	. o dournaid	T-4	220/132	160	700	610	87.14
		T-5	220/132	160	700	610	87.14
		T-6	220/132	160	700	610	87.14
		TR-1	525/231/22	450	1125	1132	100.62
<u>ح</u>		TR-2	525/231/22	450	1125	1132	100.62
Ilta	Multan	TR-3	220/132	160	700	670	95.71
Σ		TR-4	220/132	160	700	670	95.71
_		TR-5	220/132	160	700	670	95.71
	Muzaffargarh	ATB-2	525/231/23	600	1500	1280	85.33
d e		T-1	220/132	160	700	620	88.57
lyd aba	Shikarpur	T-2	220/132	160	700	620	88.57
ат	market and the	T-3	220/132	160	700	620	88.57

Source: NTDC

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B. Overloading of 220 kV and 132 kV Power Transformers installed at 220 kV Grid Stations (as of June, 2018):

Region	Name of Grid Station	Auto and Power T/F	Voltage Level	Capacity (MVA)	Capacity (Ampere)	Load (Ampere)	Overload (above 80%)
		T-1	220/132	250	1093	1050	96.07
		T-2	220/132	250	1093	1050	96.07
	Mardan	T-3	220/132	250	1093	1040	95.15
		T-4	132/11	40	2008	1870	93.13
		T-5	132/11	40	2008	1980	98.61
	De al Klasti	T-1	220/132	160	700	573	81.86
	Daud Khall	T-2	220/132	160	700	573	81.86
		T-1	220/132	160	700	610	87.14
p		T-2	220/132	160	700	610	87.14
aba	Bannu	T-3	132/11	20/26	1305	1300	99.62
am		T-4	132/11	40	2008	1740	86.65
Isl		T-5	220/132	160	700	610	87.14
		T-1	220/132	160	700	660	94.29
	Sang Jani	T-2	220/132	160	700	660	94.29
		T-3	220/132	160	700	660	94.29
		T-4	220/132	160	700	660	94.29
		T-5	132/11	20/26	1305	1055	80.84
	University	T-1	220/132	250	1093	970	88.75
	University	T-5	132/11	20/26	1305	1368	104.83
	Shahi Bagh	T-5	132/11	10/13	653	582	89.13
	Chishtian	T-1	220/132	160	700	641	91.57
		T-2	220/132	160	700	641	91.57
		T-1	220/132	160	700	675	96.43
	Muzanargani	T-2	220/132	160	700	675	96.43
		T-1	220/132	160	700	662	94.57
ue	Babawalpur	T-2	220/132	250	1093	990	90.58
ult	Banawatpui	T-3	220/132	250	1093	990	90.58
Σ		T-4	132/11	20/26	1305	1196	91.65
		T-1	220/132	125/160	700	700	100.00
	Vehari	T-2	220/132	125/160	700	700	100.00
		T-3	220/132	125/160	700	710	101.43
	Kassowal	T-1	220/132	160	700	664	94.86
	Rassowar	T-2	220/132	160	700	664	94.86
ਰ ਰ		T-1	220/132	160	700	600	85.71
yde bae	Hala Road	T-2	220/132	160	700	600	85.71
ла		T-5	132/11	20/26	1305	1100	84.29
_	Cible:	T-3	132/11	20/26	1305	1260	96.55
ette	SIDDI	T-4	132/11	20/26	1305	1260	96.55
βυί	Quetta	T-1	220/132	160	700	560	80.00
Ŭ	Industrial-II	T-2	220/132	160	700	560	80.00

Region	Name of Grid Station	Auto and Power T/F	Voltage Level	Capacity (MVA)	Capacity (Ampere)	Load (Ampere)	Overload (above 80%)
		T-1	220/132	160	700	657	93.86
		T-2	220/132	160	700	633	90.43
	Jaranwala	T-3	220/132	160	700	628	89.71
		T-4	220/132	160	700	680	97.14
		T-6	132/11.5	20/26	1305	1185	90.80
	Contractor	T-1	220/132	160	700	590	84.29
	Sammunari	T-2	220/132	160	700	620	88.57
	Rudu	T-3	220/132	160	700	620	88.57
		T-1	220/132	160	700	645	92.14
	Ludewala	T-2	220/132	160	700	645	92.14
		T-3	220/132	250	1093	970	88.74
	Bandala	T-1	220/132	250	1093	900	82.34
		T-1	220/132	250	1093	1050	96.06
	Toba Tek Singh	T-2	220/132	160	700	620	88.57
		T-3	220/132	160	700	620	88.57
		T-1	220/132	160	700	670	95.71
		T-2	220/132	160	700	590	84.29
	Ghakkar	T-3	220/132	160	700	700	100.00
		T-5	132/11.5	26	1305	1270	97.32
		T-6	132/11.5	26	1305	1250	95.79
ė	Kala Shah Kaku	T-7	132/11.5	26	1305	1140	87.36
hoi	NKLP LHR	T-1	220/132	250	1093	1075	98.35
La		T-2	220/132	250	1093	1130	103.39
		T-3	220/132	250	1093	1130	103.39
		T-4	132/11.5	40	2008	1610	80.18
		T-5	132/11.5	40	2008	1930	96.12
		T-6	132/11.5	40	2008	1825	90.89
		T-1	220/132	250	1093	940	86.00
	Ravi LHR	T-2	220/132	250	1093	900	82.34
		T-3	220/132	250	1093	900	82.34
		T-1	220/132	160	700	700	100.00
	Sarfaraz	T-2	220/132	160	700	700	100.00
	Nagar	T-3	220/132	160	700	700	100.00
		T-6	220/132	160	700	700	100.00
	C'all at	T-4	132/11.5	13	653	625	95.71
	Slaikot	T-5	132/11.5	26	1305	1075	82.38
		T-1	220/132	160	700	620	88.57
		T-2	220/132	160	700	620	88.57
		T-3	220/132	160	700	620	88.57
	WAPDA Town	T-4	132/11.5	40	2008	1850	92.13
		T-5	132/11.5	40	2008	1840	91.63
		T-6	132/11.5	40	2008	1915	95.37
	GZR	T-1	220/132	250	1093	890	81.43

Source: NTDC

3.4 CONSTRAINTS IN NTDC SYSTEM

During FY 2017-18, the progress reports on the ongoing power evacuation projects and development projects, submitted by NTDC, show that NTDC could not complete a number of projects as per their scheduled dates, therefore completion dates of said projects were extended. Failure to complete projects,

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results in not only cost over-runs but also in uneconomic power dispersal. NTDC while agreeing to delays in its planned projects, reported the following constraints, which hindered progress on certain projects:

3.4.1 **Power Curtailment from Wind Clusters in South Region:**

The transmission constraints in HESCO network are leading to generation curtailment of Wind Power Plants in the HESCO area resulting in heavy payment against NPMV. Presently out of 783.9 MW total installed capacity of wind energy, approximately 485 MW can be evacuated and remaining 298.9 MW was forced to be curtailed during high wind period. There are three wind clusters in southern networks:

Jhampir New Cluster (379 MW)

- 1. Yunus WPP (50 MW)
- 2. Gul Ahmed WPP (50 MW)
- 3. Metro WPP (50 MW)
- 4. Master WPP (50 MW)
- 5. Tapal WPP (30 MW)
- 6. United UEP WPP (99 MW)
- 7. Sachal WPP (50 MW)

Jhampir Old Cluster (204.9 MW)

- 1. FFCEL WPP (49.5 MW)
- 2. Zorlu WPP (56.4 MW)
- 3. TGF WPP (49.5 MW)
- 4. Sapphire WPP (49.5 MW)

Gharo Cluster (200 MW)

- 1. FWEL-I WPP (50 MW)
- 2. FWEL-II WPP (50 MW)
- 3. Tenaga WPP (50 MW)
- 4. Hydro China WPP (50 MW)

3.4.1.1 Jhampir New Cluster:

There are two major constraints of HESCO network, which hamper the full evacuation of WPP generation in Jhampir New Cluster:

- (a) Bus bar capacity of 132 kV TM Khan Grid station is restricted to 1000 amperes.
- (b) Presently 132 kV TM Khan-NTPS Hyderabad circuit is kept open position by RCC Jamshoro due to load restriction of 150 ampere against rated capacity of 488 amperes of Lynx Conductor.

3.4.1.2 Gharo Cluster:

The main constraints of Gharo Cluster comprise of the following:

- (a) Two circuits, 132 kV Thatta-Sajawal and 132 kV Thatta-Jhampir operated under severe load restriction of 250 and 225 amperes against rated capacity of 516 and 900 amperes respectively. Whereas 132 kV Kotri-Jhampir circuit operated under load restriction of 400 amperes against rated capacity of 900 amperes.
- (b) On average only 103 MW can be evacuated safely against installed capacity of 200 MW of WPPs. In case Thatta Power Plant is on bar (18.8 MW), then only 85 MW can be evacuated.

3.4.1.3 Jhampir Old Cluster:

The main constrains of Jhampir Old Cluster comprise of following:

Two Circuits; 132 kV Jhampir-Kotri and 132 kV Nooriabad-Jamshoro Old, operated under load restriction of 400 and 500 amperes against rated capacity of SDC 900 amperes respectively. However only 10 MW to 20 MW generation curtailment is in place currently. The following solutions are to be considered to remove these constraints however further progress has not yet been achieved:

(a) 132 kV Bus Bar at TM Khan should be sectionalized/augmented with twin bundle on urgent basis. 132 kV TM Khan-NTPS circuit should be taken in service and its restriction limits should be revived in consultation with GSO HESCO Hyderabad.

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- (b) Load restriction of 132 kV Kotri-Jhampir circuit, 132 kV Thatta-Jhampir circuit, 132 kV Thatta-Sajawal circuit should be revised in order to minimize generation curtailment of Gharo cluster as these circuits have been recently rehabilitated by HESCO. On immediate basis RCC may raise loading of these circuits by 100 amperes each in addition to their current restricted limit in consultation with GSO HESCO formation.
- (c) CT ratios of all 132 kV wind corridor circuits specially 132 kV Kotri-Kotri Site and 132 kV Kotri-Latifabad circuits should be revised according to current carrying capacity of conductors.
- (d) Conversion of 220 kV KDA-Jamshoro circuit-II 132 kV Jamshoro New-Nooriabad circuit as already proposed may be executed. Additionally 132 kV Nooriabad-Jamshoro Old circuit which is already under construction phase need be expedited.

3.4.2 Project-wise Cost and Time Over-run:

Delays in completion of transmission projects not only affect the operational performance of the system, these may also lead to cost and time over runs which are then required to be passed on to the consumers. As on 30th June 2018, details of cost and time over runs incurred on some of the projects which required extension of time over their scheduled completion dates are presented in the following table. It was noted that some of these delays were cause of major constraints in the transmission system.

S. No.	Name of Project	PC-I Cost (Rs. in Million) & Approval Date	Scheduled Completion Date	Actual Completion Date	Expenditure upto June, 2018	Balance Cost (Rs. in Million)
		Cost Over-ru	n Projects			
1	132 kV Thatta-Mirpur Sakro in/out FWEL-1&2 WPP with 6x132 kV line bay and Jhampir Nooriabad Zorlu	816.00 (22-04-2006)	14-06-2014	12-06-2014	1,486.10	(670.10)
2	220 kV G/S at Khuzdar/220 kV Dadu-Khuzdar D/C T/Line	8,540.00 (ECNEC 04-08-2006)	26-12-2009	03-02-2018	11,538.90	(2,998.90)
3	220/132 Dera Murad Jamali Sub Station	880.00 (07-04-2011)	05-02-2014	13-05-2018	1,026.00	(146.00)
4	220 kV G/S at Ghazi Road, Lahore with 220 kV D/C T/Line	2,591.00 (25-02-2005)	31-12-2007	28-02-2019	4,700.90	(2,109.90)
		Time Over-ru	n Projects			
5	220 kV Rohri Sub Station and Associated T/Line	4,847.00 (22-10-2007)	27-06-2012	30-08-2014	4,408.60	438.40
6	Transmission Interconnection for Dispersal of Power from Uch-II	2,330.00 (29-07-2011)	29-06-2016	05-05-2018	2,299.30	30.70
7	Power Dispersal from 1,200 MW Thar Coal PP-500 kV Thar-Matiari T/Line & Matiari 500 kV Sub-Station	20,053.00 (16-08-2012)	20-12-2016	31-07-2018	14,364.90	5,688.10
8	220 kV Chakdara Sub Station	3,230.00 (02-10-2014)	30-11-2014	16-09-2018	1,668.70	1,561.30
9	220 kV G/S and allied T/Line DI Khan	3,744.00 (09-12-2010)	30-04-2013	30-11-2018	1,584.00	2,160.00
10	220 kV Nowshehra Sub Station	1,875.00 (06-02-2008)	30-04-2010	31-01-2019	934.80	940.20
11	220 kV Sub Station Lalian	1,581.50 (11-11-2011)	30-06-2013	Will be provided on finalization of Land	1,391.00	190.40
12	3 rd 500 kV Jamshoro-Moro-RY Khan S/C T/Line	37,234.30 (28-08-2013)	31-12-2016	28-02-2019	19,362.20	17,872.10
13	Evacuation of power from 1320 MW Power Plant at Bin Qasim	12,977.00 (13-05-2015)	Ph-I 28-05-2017 Ph-II 28-01-2018	Ph-I 01-11-2017 Ph-II 28-02-2019	4,613.80	8,363.20

Source: NTDC

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At the time of writing this report however, NTDC reported following improvement schemes carried out after 30th June, 2018 to overcome major constraints/congestion in its transmission networks:

- (a) Rehabilitation/Augmentation at 500 kV Port Qasim to NKI and Jamshoro circuits has been carried out in April 2019 to evacuate maximum power from Port Qasim Power Plant.
- (b) Energization of 220 kV Chakdara grid in September 2018, 220 kV D.I. Khan grid in February, 2019 and 220 kV Nowshehra grid in April, 2019 improved power supply position in various regions of PESCO.
- (c) In September 2018, 500 kV T/Line interconnection with existing Hub to Jamshoro single circuit provided evacuation of power from HUBCO Power Plant to National Grid.
- (d) At 500 kV level, in April 2019, augmentation of 500 kV Lahore grid and 500 kV Rawat grid relieved overloaded power transformers. Similarly, augmentation of 500 kV Terbela grid and 500 kV Gatti grid in May 2019 also relieved overloaded power transformers.
- (e) At 220 kV level, in January March 2019, augmentation of 220 kV Toba Tek Singh grid, 220 kV Bannu grid and 220 kV Ludewala grid relieved overloaded power transformers. Similarly, in April 2019, augmentation of 220 kV Sammundri Faisalabad grid, 220 kV Vehari grid, 220 kV Rohri grid and 220 kV Quetta Industrial grid relieved overloaded power transformers.
- (f) Efforts have been made to resolve the power curtailment issues from wind power plants located in Jhampir and Gharo wind clusters by replacing locally made disc insulators with imported disc insulators, which will expectedly be completed by June 2019 for smooth power evacuation from wind corridor.

3.5 NTDC POWER EVACUATION PROJECTS

The updated progress about the power evacuation projects as reported by NTDC is shown in the following table:

S. No.	Power Evacuation Projects	Starting Date of Project	Expected Completion Date	Total Amount Spent (Million Rs.)
1	Quaid-e-Azam Solar Park at Lal Suhanra (Phase-II) Evacuation of 600 MW Solar (Proposed to be carried out by NTDC)	12-02-2014	15-02-2018	2,074.52
2	Evacuation of Power from 147 MW Patrind HPP	27-01-2015	28-02-2018	567.87
3	Evacuation of Power from 1,200 MW LNG Based Power Project (PP) at Jhang (Haveli Bahadur Shah)	28-04-2015	15-03-2018	1,092.61
4	Evacuation of Power from 1,200 MW LNG Based PP at Balloki	09-07-2015	31-03-2018	2,234.45
5	Transmission Interconnection for Dispersal of Power from Uch- II Tranch-III	16-08-2012	30-04-2018	2,349.51
6	Evacuation of Power from 1,320 MW Power Plant at Sahiwal	31-08-2018	30-06-2018	260.57
7	Inter-Connection (Power Dispersal from 1,200 MW Thar Coal PP - 500 kV Thar-Matiari T/L and Matiari 500 kV Sub Station)	16-08-2012	30-09-2018	14,897.33
8	Evacuation of Power from 1,320 MW Power Plant at Bin Qasim	13-05-2015	28-02-2019	4,927.04
9	Construction of 500 kV T/L for Dispersal of Power from 747 MW Guddu	29-07-2011	30-02-2019	5,841.45
10	Evacuation of Power from Wind Power Projects at Jhimpir and Gharo Wind Clusters	03-07-2014	31-12-2019	9,643.89
11	Import of 100 MW Power from Iran (with 220 kV G/S Gwadar and allied T/L from Iran to Gwadar funded by Iran	19-09-2007	31-12-2019	1,144.74
12	Transmission for Dispersal of Power from Neelum-Jhelum Hydropower Project	26-08-2013	31-12-2019	12,314.18
13	Evacuation of Power from 1,320 MW Hub Power Company Ltd.	07-11-2016	31-12-2019	558.05
14	Interconnection Scheme for import of Power from CASA-1000	07-05-2015	30-06-2021	845.45
15	Evacuation of Power from 1,320 MW RLNG Power Plant at Trimmu, Jhang	04-12-2017	30-06-2022	1,563.68
16	Evacuation of Power from 2,160 MW Dasu Hydropower Project Stage-I	2018-19	30-06-2022	282.79
		12 st	Total	60,598.13

Source: NTDC

3.6 INVESTMENT PLANS OF NTDC

NTDC reported its audited record of the actual expenditure along with requested investment against each project undertaken in FY 2017-18 in the following table grouped under relevant heads:

S.	Name of Projects	Investm 2017	ent for -18	To be carried
No.		Claimed	Spent	over to 2018-19
Aug	mentation of Existing System			
1	Augmentation of 500/220 kV and 220/132 kV Transformer in NTDC System	50.0	-	50.0
2	Ext/Aug. of existing of 500 and 220 KV G/S of NTDC system by installation of additional T/Fs	150.0	59.5	90.5
3	Extension/Augmentation at 500/220 kV Rawat Substation	450.0	228.1	221.9
4	Extension/Augmentation of Existing Grid Stations	100.0	73.2	26.8
5	Conversion from 220 kV AIS Grid Stations in GIS Grid Stations 220-KV Kala Shah Kaku, 220 kV Bund Road, 220 kV Nishatabad, 220 kV Jaranwala	10.0	-	10.0
6	Reinforcement of existing 220 kV Guddu-Uch-Sibbi Single Circuit T/L for improvement of Power Supply System in South Area	10.0	-	10.0
	Total - (Augmentation)	770.0	360.9	409.1
Pow	er Evacuation Projects			
7	132 kV Thatta Mirpur Sakro in and out FWEL-I and II WPP with 6x132 kV line bay and Jhimpir Nooriabad Zorlu	50.0	-	50.0
8	Construction of 500 kV T/L for Dispersal of Power from 747 MW Guddu	1,000.0	933.6	66.4
9	Evacuation of Power from Wind Power Projects at Jhimpir and Gharo Wind Clusters	1,000.0	1,314.9	(314.9)
10	Import of 100 MW Power from Iran (with 220 kV G/S Gwadar and allied T/L form Iran to Gwadar funded by Iran	10.0	-	10.0
11	Interconnection of Chashma Nuclear (C-3 and C-4)	300.0	110.4	189.6
12	Interconnection (Power Dispersal from 1200 MW Thar Coal Power Plant – 500 kV Thar - Matiari T/L and Matiari 500 kV S/station)	9,000.0	11,078.3	(2,078.3)
13	Quaid-e-Azam Solar Park at Lal Suhanra (Phase-II) Evacuation of 600 MW Solar (Proposed to be carried out by NTDC)	200.0	155.4	44.6
14	Transmission for Dispersal power from Neelum-Jhelum Hydropower Project	4,000.0	3,335,4	664.6
15	Transmission Interconnection for Dispersal of Power From Uch-II Tranch-III	400.0	374.3	25.7
16	Evacuation of Power from 1,200 MW LNG Based Power Project at Balloki	520.0	513.8	6.2
17	Evacuation of Power from 1,200 MW LNG Based Power Project at Bhikki	38.0	24.4	13.6
18	Evacuation of Power from 1,200 MW LNG Based Power Project at Haveli Bahadur Shah	1,020.0	271.6	748.4
19	Evacuation of Power from 1,320 MW Power Plant at Bin Qasim	3,500.0	2,889.2	610.8
20	Evacuation of Power from 1,320 MW Power Plant at Sahiwal	320.0	219.8	100.2
21	Evacuation of Power from 147 MW Patrind Hydropower Project	100.0	87.8	12.2
22	Evacuation of Power from 1,320 MW RLNG Power Plant at Trimmu, Jhang	3,700.0	1,310.0	2,390.0
23	Allied Switching Station and its Interconnection with Suki Kinari HPP (Evacuation of Power from 840 MW Suki Kinari HPP)	100.0	-	100.0
24	Evacuation of Power from 2,160 MW Dasu HPP Stage-I	400.0	94.9	305.1
25	Interconnection Scheme for Import of Power from CASA-1000	10.0	0.6	9.4
26	Evacuation of Power from 1,320 MW Hub Power Company Limited	500.0	306.0	194.0
27	Evacuation of Power from Tarbela 5^{n} Extension	5.0	-	5.0
28	Evacuation of Power from Karot and Azad Pattan Hydropower Projects	10.0	-	10.0
29	Evacuation of Power from 350 MW Siddiquesons Limited	10.0	-	10.0
30	Evacuation of Power from K2/K3 Nuclear Power near Karachi (In/Out of 500 kV Port Qasim to Matiari S/C and 500 kV Hub to Matiari S/C at K2/K3)	100.0	the -	100.0
31	Evacuation of Power from 300 MW Solar Power Plants near Chishtian	10.0		10.0
32	Evacuation of Power from 2x660 MW Thar Coal Based SSRL/SECL Power Plant at Thar	10.0	1	10.0
33	Evacuation of Power from 500 MW Wind Power Plants at Jhimpir Clusters	10.0		10.0
	Total - (Evacuation)	26,323.0	23,020.4	3,302.6

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S.	Name of Projects	Investm 2017	ent for -18	To be carried
No.		Claimed	Spent	over to 2018-19
New	Grid and T/Lines			
34	220 kV Rohri Sub Station and Associated T/L for Dispersal of Power from IPPs Fauji Foundation and Engro near Karachi	25.0	-	25.0
35	220 kV G/S and Allied T/L D.I. Khan	1,550.0	855.4	694.6
36	220 kV G/S at Ghazi Road, Lahore with 220 KV D/C T/Line 132 kV Expansion System EDCF Loan No. PAK-2 and KFW	1,800.0	1,532.8	267.2
37	220 kV G/Station at Kassowal with 132 kV Expansion System (World Bank Loan No. 7565-PK, Credit No. 4463-PK and 4464-PK)	50.0	67.6	(17.6)
38	220 kV Nowshera S/S	900.0	829.1	70.9
39	220 kV T/L from Chashma to Ludewala for Interconnection of CHASNUPP-II	5.0	-	5.0
40	220/132 kV Dera Murad Jamali Sub Station	300.0	146.5	153.5
41	220 kV Chakdara S/S	1,800.0	720.5	1,079.5
42	220 kV G/S Mansehra Tranch-III	350.0	461.8	(111.8)
43	220 kV Sub Station Lalian	950.0	868.6	81.4
44	2 nd Source of Supply 220 kV IBD University S/S (Now 220 kV Transmission System Network Reinforcement in IBD and Burhan)	600.0	392.8	207.2
45	3 rd 500 kV Jamshoro-Moro-R.Y. Khan Single Circuit T/L Tranch-III	2,000.0	3,737.9	(1,737.9)
46	New Projects to be financed by JBIC (i) 500 kV RY Khan G/S & T/L (ii) 220 KV Chishtian T/L (iii) 220 kV Gujrat G/S & 220 kV T/L (iv) 220 kV Shalamar G/S & 220 kV T/L (4 Projects - JBIC Loan)	2,000.0	1,756.4	243.6
47	Addition of 500/220 kV Sub Station T/L for Strengthening the existing NTDC system i) 500 kV Lahore New ii) 500 kV Shikarpur iii) 220 kV D.I. Khan (JICA-PK-61)	2,500.0	3,300.7	(800.7)
48	New 220 kV G/Station at Khuzdar/220 kV Dadu - Khuzdar D/C T/Line JICA Loan No. PK-56	150.0	199.7	(49.7)
49	Power Transmission Enhancement Project (Tranch-II) (SET) 10 Sub projects (i) 9 Sub Projects of 500 kV & 220 kV S/S & T/Ls	300.0	761.8	(461.8)
50	Power Transmission Enhancement Project Tranch-I (19 Sub Projects of 500/220 kV Sub Stations and T/Lines)	50.0	20.3	29.7
51	500 kV Faisalabad New (2x750) (Now 500 kV Faisalabad West along with allied T/Ls)	100.0	717.2	(617.2)
52	220 kV Mirpur Khas G/S along with allied T/Ls	300.0	179.4	120.6
53	500 kV Chakwal G/S along with allied T/Ls	300.0	239.4	60.6
54	500 kV Islamabad West	300.0	-	300.0
55	500 kV HVAC T/Line for interconnection of HVDC Converter Station at Lahore with existing HVAC System	100.0	-	100.0
56	220 kV Mastung G/S along with allied T/Ls	50.0	-	50.0
57	500 kV Lahore, North	10.0	-	10.0
58	220 kV DIK-Zhob Transmission Line along with 220 kV Zhob Sub-Station	50.0	37.5	12.5
59	220 kV Kohat G/S along with allied T/Ls	10.0	-	10.0
60	220 kV Jamrud G/S along with allied T/Ls	10.0	-	10.0
61	220 kV Kamra G/S along with allied T/Ls	5.0	-	5.0
62	220 kV Shadman G/S along with allied T/Ls (Now 220 kV Punjab University G/S & T/L)	50.0	-	50.0
63	220 kV Jauharabad G/S along with allied T/Ls	10.0	-	10.0
64	220 kV Zero Point Grid Station at Islamabad	10.0	-	10.0
	Total - (New G/S & T/L)	16,635.0	16,825.2	(190.2)
Othe	Parlated Material Transk III (New Declared of Declared Material			
65	existing grid station of NTDC System) ADB Loan No. 2846-PAK	1,600.0	1,785.9	(185.9)
66	Provision of Secured Metering System at Delivery Point (Local Bank)	100.0	9.7	90.3
67	Up-gradation of NPCC Islamabad JICA Loan No. PK-54	20.0	11.2	8.8

S.	Name of Projects	Investm 2017	Investment for 2017-18		
No.	Name of Projects	Claimed	Spent	over to 2018-19	
68	Construction of 600 kV HVDC T/L from Matiari to Lahore (Land Acquisition for Converter and Grounding Station - Both Ends) (CPEC)	450.0	206.0	244.0	
69	Strengthening of TSG Centre for Grid System Operations and Maintenance	200.0	12.8	187.2	
70	Enterprise Resource Planning (Now Implementation of Integrated Solution to improve Productivity and Control in NTDC by ERP System)	50.0	-	50.0	
71	Construction of 600 kV HVDC T/L from Matiari (Port Qasim) to Faisalabad (Land Acquisition for Converter and Grounding Station - Both Ends) (CPEC)	10.0	-	10.0	
72	Rehabilitation of NTDC system in south area for improvement in system reliability to avoid the frequent tripping	200.0	104.4	95.6	
73	600 kV HVDC T/Line from Thar to Lahore along with Converter and Grounding Stations at both ends (Feasibility)	10.0	-	10.0	
74	Feasibility Study for enhancing the transmission capacity of NTDCs 500 kV Transmission System by applying series compensation	10.0	-	10.0	
75	Up-gradation/ Extension of NTDC's Telecommunication and SCADA System at NPCC	50.0	-	50.0	
	Total - (Others)	2,700.0	2,130.0	570.0	
	Grand Total	46,428.0	42,336.5	4,091.5	

Source: NTDC

It is observed that some projects would continue in FY 2018-19 and the remaining amount of Rs. 4,091.5 million (as shown above) would be carried forward and accommodated in the next investment plan for FY 2018-19 as and when submitted by NTDC.

It is also observed that on ten (10) of the above listed projects, NTDC has spent excess amounts than requested. Upon enquiry, NTDC provided the following reasons of excess expenditure on the projects and assured that the excess amounts will be adjusted in the next year's investment plans i.e. FY 2018-19:

S.	Name of Projects	Investment for 2017-18		To be carried over	Reasons of Excess Expenditure
NO.		Claimed	Spent	to 2018-19	-
1	Evacuation of Power from Wind Power Projects at Jhimpir and Gharo Wind Clusters	1,000	1,314.90	-314.90	Project was carried out on priority basis for power evacuation from WPPs and completed the Jhimpir G/S and Jhimpir/ Gharo T/L to meet with the timelines.
2	Interconnection (Power Dispersal from 1200 MW Thar Coal Power Plant - 500 kV Thar - Matiari T/L & Matiari 500 kV S/station)	9,000	11,078.30	-2,078.30	To meet with the power evacuation timeline before the COD of power plant the project carried out on priority basis after clearance of ROW issues.
3	220 kV G/Station at Kassowal with 132 kV Expansion System (World Bank Loan No. 7565-PK, Credit No. 4463-PK & 4464-PK)	50	67.60	-17.60	Payment of pending works and liabilities.
4	220 kV G/S Mansehra Tranch-III	350	461.80	-111.80	Project completed and energized in 2017-18.
5	3 rd 500 kV Jamshoro-Moro- R.Y. Khan Single Circuit T/L Tranch-III	2,000	3,737.90	-1,737.90	In the absence of Matiari G/S which is the part of HVDC project, the only possibility for dispersal of power to include in National Grid was to complete this line on war footing basis and to utilize the committed ADB loan as well.

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S.	Name of Projects	Inves for 20	tment)17-18	To be carried over	Reasons of Excess Expenditure
NO.		Claimed	Spent	to 2018-19	
6	Addition of 500/220 kV Sub Station T/L for Strengthening the existing NTDC system i) 500 kV Lahore New ii) 500 kV Shaikupura iii) 220 kV D.I. Khan (JICA-PK-61)	2,500	3,300.70	-800.70	New Lahore G/S completed and 04 Nos. T/L work expedited on resolution of ROW issues.
7	New 220 kV G/Station at Khuzdar/220 kV Dadu - Khuzdar D/C T/Line JICA Loan No. PK-56	150	199.70	-49.70	Payment of retention money and pending liabilities.
8	Power Transmission Enhancement Project (Tranch-II) (SET) 10 Sub Projects (i) 9 Sub Projects of 500 kV and 220 kV S/S & T/L ADB Loan No. 2396-PAK	300	761.80	-461.80	Completed the extension/ augmentation work in various G/S and Payment made for pending liabilities of closed projects.
9	500 kV Faisalabad New (2x750) (Now 500 kV Faisalabad West along with allied T/Ls)	100	717.20	-617.20	The cost of land acquisition was higher as compare to provision made against the project.
10	Depleted Material Tranch-III (Now Replacement of Depleted Material at existing grid station of NTDC System) ADB Loan No. 2846-PAK	1,600	1,785.90	-185.90	The material was anticipated to be received in next FY, however expedited and received and paid in 2017-18.

Source: NTDC

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3.7 OUTAGES ON TRANSMISSION LINES OF NTDC (500 KV AND 220 KV) The following table provides circuit-wise detail of outages on 500 kV and 220 kV transmission lines as reported by NTDC:

s		Tota Trippi	al No. of ing during	s		Total No. of Tripping during	
No.	Name of Circuit	June, 2018	January- June, 2018	No.	Name of Circuit	June, 2018	January- June, 2018
			500 kV Trans	missior	Lines		•
1	Tarbela-Barotha No. 2	1	2	19	Dadu-Jamshoro-I	0	1
2	Barotha-Gatti No. 1	0	2	20	Jamshoro-Dadu-II	0	1
3	Barotha-Gatti No. 2	0	1	21	Guddu-Shikarpur-I (in & out)	0	1
4	Gatti-QATPL (Bhikki)	0	1	22	Shikarpur-Dadu-I (in & out)	0	2
5	Gatti-Multan	0	1	23	23 Guddu-Shikarpur-II (in & out)		3
6	Gatti-Rousch	0	3	24	24 Dadu-Guddu-II		2
7	M/Garh-HB Shah	1	1	25	25 Hub-NKI		1
8	Gatti-HB Shah-1	0	3	26	NKI-Port Qasim	3	7
9	Multan-Yousafwala	2	2	27	Port Qasim-Jamshoro	2	3
10	Balloki-New Lahore (South)	0	3	28	Hub-Jamshoro-II	1	7
11	New Gakhar-Lahore (SKP-1)	0	1	29	Multan-DG Khan	0	3
12	Tarbela-Sheikh Muhammadi Peshawar	0	1	30	DG Khan-Guddu	0	7
13	Tarbela-Rawat	1	2	31	Multan-Guddu 747 MW	0	3
14	Barotha-Rawat-I	0	1	32	Multan-RY Khan	0	2
15	Barotha-Rawat-II	0	1	33	RY Khan-Guddu 747 MW	0	2
16	Rawat-Nokhar-I	0	2	34	Multan-M/Garh	0	1
17	Rawat-Neelum Jhelum	Line En	ergized and	35	M/Garh-Guddu	0	5
18	Neelum Jhelum-Nokhar	under Testing Mode		36	Guddu 747 MW-Guddu Old	0	3

S.	Name of Circuit	Tot Tripp	al No. of ing during	S.	Name of Circuit	Total No. of Tripping during	
No.	Nume of circuit	June, 2018	January- June, 2018	No.	Hume of Circuit	June, 2018	January- June, 2018
			220 kV Trans	missior	Lines		•
1	Gatti-NBD No. 1	0	1	55	Daudkhel-Sheikh Muhamadi P-I	0	3
2	Gatti-NBD No. 2	0	2	56	Daudkhel-Sheikh Muhamadi P-II	1	8
3	Gatti-JWR No. 1	0	2	57	Daudkhel-CHASNUPP-II	0	1
4	Gatti-JWR No. 2	0	1	58	Daudkhel-Bannu-I	0	1
5	Gatti-Yousafwala No. 1	0	3	59	Sheikh Muhammadi P-S Bagh	0	1
6	Gatti-Yousafwala No. 2	0	4	60	Mardan-Shahi Bagh	0	2
7	Gatti-L/Wala No. 1	0	2	61	CHASNUPP-Bannu-I	0	1
8	Gatti-L/Wala No. 2	0	3	62	CHASNUPP-Bannu-II	0	2
9	Chashma-L/Wala No. 1	0	1	63	ISPR-Mansehra-I	0	2
10	Multan-ITS No. 2	1	1	64	ISPR-Mansehra-II [ISPR-Allai Khwar-II]	0	2
11	TT Singh-SRD No. 1	0	3	65	Tarbela-Burnan-I	2	3
12		0	2	60	Tarbela Burban III	1	2
13		2	0	69		0	2 1
14	Bandala Catti No. 1	0	5	60	Powat ISPR	0	1
15	Bandala-Gatti No. 1	0	2	70	Babria Town-ISPR	0	1
17	KS Kaku-Bandala-I	1	5	70	Bawat-I Iniversity-I	1	1
18	KS Kaku-Bandala-I	1	4	72	Rawat-University-II	0	1
19	Bund Road-Sheikhupura-I	0	1	73	Mangla-Rawat-I	0	3
20	Bund Road-Sheikhupura-II	0	1	74	Mangla-Rawat-II	0	2
21	Bund Road-Sheikhupura-III	0	2	75	Jamshoro-KDA33-I	0	1
22	Bund Road-Sheikhupura-IV	1	4	76	Jamshoro-TM Khan Road-I	0	1
23	Bund Road-KS Kaku-I	2	3	77	Jamshoro-TM Khan Road-II	0	1
24	Bund Road-KS Kaku-II	0	3	78	Jhampir-TM Khan-I	10	13
25	Bund Road-New Kot Lakhpat-I	1	8	79	Jhampir-TM Khan-II	8	12
26	Bund Road-New Kot Lakhpat-II	1	5	80	Guddu-Sibbi (Direct Ckt)	1	3
27	Ghakkar-Mangla	0	2	81	Guddu-Shikarpur-I	0	2
28	New Ghakkar-Gujrat	1	4	82	Guddu-Shikarpur-II	0	2
29	New Ghakkar-Ghakkar	0	3	83	Shikarpur-Uch-I	0	1
30	Gujrat-Mangla-II	1	1	84	Shikarpur-Uch-II	0	6
31	Ghakkar-Gujrat	0	1	85	Uch-Sibbi-I	1	1
32	Ghakkar-Sialkot	0	1	86	DM Jamali-Sibbi	2	2
33	KS Kaku-Sialkot	1	3	87	Uch-Sibbi-II	0	3
34	KS Kaku-Mangla-II	1	1	88	Sibbi-Quetta Industrial-I	0	1
35	KS Kaku-Mangla-III	1	5	89	Shikarpur-Ronri-I	0	1
30	KS Kaku-Ravi	0	2	90	Snikarpur-Konri-II	0	11
20	KS KdKU-Glidzi	0	4	91		0	7
20	Pavi-Shalamar	0	1	92		2	1
10	Ravi-Jahore (SKP)	0	1	93	Multan-NGPS-I	0	2
40	Ravi-Atlas Power	0	4	94	Multan-NGPS-II	0	2
42	SKP-Atlas Powerbouse	0	2	96	Multan-TTS (upto Head Sidhnai)-I	1	1
43	New Kot Lakhpat-Lahore (SKP)	1	2	97	Multan-TTS (upto Head Sidhnai)-II	1	1
44	New Kot Lakhpat-WAPDA Town	0	2	98	TPS M/Garh (Ph-I)-Multan-I	0	2
45	WAPDA Town-Sheikhupura	0	5	99	TPS M/Garh (Ph-I)-Multan-IV	0	2
46	New Kot Lakhpat-Sarfraz Nagar-I	1	4	100	TPS M/Garh (Ph-2)-Multan-III	0	3
47	New Kot Lakhpat-Sarfraz Nagar-II	0	3	101	220 kV M/Garh-Multan-II	1	4
48	Sarfraz Nagar-New Okara-I	1	5	102	220 kV M/Garh-TPS M/Garh (Ph-2)	0	1
49	Sarfraz Nagar-New Okara-II	1	1	103	KAPCO-Multan-III	0	2
50	Kassowal-Yousafwala-I	0	5	104	KAPCO-Multan-IV	0	2
51	Kassowal-Yousafwala-II	0	5	105	Vehari-Multan-I	0	1
52	Yousafwala-Okara-II	0	4	106	Vehari-Multan-II	1	2
53	New Kot Lakhpat-New Lahore (South)	SH 1	1	107	Vehari-Chishtian-I	1	1
54	Tarbela-Mardan-II	0	1	1	Source: NTDC	Re-	- 1

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3.8 DETAILS OF BLACKOUTS/BROWNOUTS IN NTDC SYSTEM

The following table provides a list of major blackout/brownout in NTDC system during last five years causing cascaded tripping in different parts of the country.

S. No.	Date and Time	Туре	Reason	Restoration Time
1	12-12-2014 at 12:50 hrs	Partial (from Guddu to Peshawar)	Tripping of Auto Transformers at Guddu due to overloading caused splitting of Northern and Southern Part. Northern Part (Guddu to Peshawar) went under dark due to low frequency.	From Peshawar to Guddu at 20:34 hrs (Duration 7 hrs and 44 minutes)
2	21-12-2014 at 03:30 hrs	Partial (from Karachi to Dadu)	500 kV Guddu-Dadu CCT 1 & 2 went under fault due to heavy fog in Guddu and Dadu area. Southern Part (Dadu-Hub-K Electric) went under due to low frequency.	From Dadu to Karachi at 14:20 hrs (Duration 10 hrs 47 minutes)
3	08-01-2015 at 05:50 hrs	Partial (from Guddu to Peshawar)	Tripping at Guddu causing splitting of Northern and Southern Part due to heavy fog in Guddu area. Northern Part (Guddu to Peshawar) went under dark due to low frequency.	From Peshawar to Guddu at 15:00 hrs (Duration 9 hrs 45 minutes)
4	24-01-2015 at 23:53 hrs	Major (from Karachi to Peshawar)	Tripping of 220 kV Uch-I-Sibbi CCT 2 due to sabotage activity. Auto Transformers at Guddu tripped on overloading causing low frequency.	From Peshawar to Karachi at 08:10 hrs (Duration 8 hrs 17 minutes)
5	15-01-2016 at 09:21 hrs	Partial (from Multan to Peshawar)	Damage of porcelain insulator of isolator D5Q11 controlling 220 kV Muzaffargarh Phase-2-Multan CCT 3.	From New Multan to Sheikh Muhammadi Peshawar at 16:40 hrs (Duration 7 hrs 19 minutes)
6	21-01-2016 at 15:07 hrs	Partial (from Muzaffargarh to Peshawar)	Tripping of 500/220 kV 450 MVA Auto Transformers T-3 along with 500 kV Guddu Old-Guddu 747 Circuit.	From Muzaffargarh to Sheikh Muhammad Peshawar at 20:25 hrs (Duration 5 hrs 18 minutes)
7	16-05-2018 at 09:28 hrs	Partial (from Guddu to Peshawar)	Tripping of three number 500 kV Guddu 747-RY Khan, 500 kV Guddu-DG Khan and 500 kV Guddu- Muzaffargarh due to fault on shunt reactor at Guddu 747 and tripping of two number of RLNG plants i.e. HB Shah and Bhikki (2400 MW) resulted in cascaded tripping in the Northern Part from Guddu to Peshawar leading to power collapse in North (Punjab and KPK)	From Guddu to Sheikh Muhammadi Peshawar at 18:41 hrs (Duration 9 hrs 13 minutes)

Source: NTDC

3.9 POWER BALANCES OF K-ELECTRIC LIMITED SYSTEM

The power balances show the year-wise position of demand and supply gap in the system. It also helps in assessing the load management policy of the power utility company. The following table shows the power balances of KEL:

Year ending 30 th June	Installed Capacity (MW)	Planned Generation Capability as per KEL (MW)	KEL's Projected Demand Growth Rate (%)	KEL's Projected Demand during Peak hours (MW)	Surplus/ (Deficit) (MW)
2019	2,950	3,147	8.8	3,836	-689
2020	3,200	3,361	6.5	4,087	-726
2021	4,530	4,638	7.1	4,376	262
2022	5,980	5,356	6.7	4,668	688
2023		5,356	6.1	4,952	404

Source: KEL

3.10 LOADING POSITION OF POWER TRANSFORMERS IN K-ELECTRIC LIMITED SYSTEM

KEL, has a total of 8 Grid Stations at 220/132 kV level, with 13 auto transformers of 3080 MVA transformation capacity, 63 Grid Stations at 132/11 kV level, with 147 power transformers with a transformation capacity of 5519 MVA. Operational record of 220/132 kV grid stations shows no overloading during the reported period of 2017-18 whereas, 32.65% of KEL's power transformers (i.e. 48 out of 147) at 132/11 kV level were found overloaded in the same time period.

3.11 K-ELECTRIC LIMITED TRANSMISSION OUTAGE STATISTICS

The following table provides a comparison of transmission outages for FY 2016-17 and FY 2017-18 as reported by KEL. It is noted that at 132 kV level, number of planned outages and total duration of outages in FY 2017-18 have decreased as compared to FY 2016-17 data. Whereas the maximum duration of any single outage increased in the FY 2017-18 as compared to the FY 2016-17. As far as forced outages are concerned, it is noted that number of forced outages, total duration of outages and maximum duration of any single outage have decreased as compared to FY 2016-17 data.

Voor	Description	Planned	Outages	Forced Outages	
rear	Description	220 kV	132 kV	220 kV	132 kV
	No. of Outages	0	9	0	45
2016-17	Total Duration in Minutes	0	5271	0	8792
	Maximum Duration of any Single Outage (Min.)	0	1315	0	970
	No. of Outages	0	7	0	26
2017-19	Total Duration in Minutes	0	4855	0	2451
2017-10	Maximum Duration of any Single Outage (Min.)	0	2320	0	362

Source: KEL

3.12 NEPRA PERFORMANCE STANDARDS (TRANSMISSION) RULES, 2005

In order to encourage safe, efficient and reliable transmission service, NEPRA has framed the Performance Standards (Transmission) Rules, 2005 (PSTR). Under PSTR, each transmission licensee is required to submit to NEPRA an Annual Performance Report (APR) in a manner prescribed therein.

3.12.1 National Transmission and Despatch Company Limited:

NTDC has submitted its report for the FY 2017-18. The same was analyzed in light of the performance parameters such as System duration of interruption, System frequency of interruption, Energy Not Served (ENS), Loss of supply incidents, System Collapses/Splitting/ Isolation, Voltage and Frequency variations violating limits prescribed in PSTR. Highlights of the analysis/findings are given in succeeding paras.

3.12.1.1 SYSTEM RELIABILITY

(i) System Duration of Interruption (Hrs/Point):

This KPI shows the average duration of outage an interconnection point experienced during a year. It was noted as 0.6 hrs. in FY 2017-18 as shown in the figure indicating 44.4% decrease in average outage duration per interconnection point as compared to preceding year.



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(ii) System Frequency of Interruption (Nos. /Circuit):

This parameter indicates the average number of outages at a circuit during a year. During FY 2017-18 it remained 0.29 as shown in the accompanying figure for 17.1% decrease in average number of outages per circuit as compared to preceding year.



3.12.1.2 SYSTEM SECURITY

(i) Energy Not Served (ENS) (MkWh):

This KPI shows the estimates of the total energy not served (ENS) contributed by loss of supply incidents during the year. The ENS increased from 75 GWh in FY 2016-17 to 469 GWh in FY 2017-18; an increase by 525.7% as compared to previous year.



(ii) Loss of Supply Incidents, Average ENS per Incident and Average duration per Incident:

The table shows no major improvement in loss of supply incidents and average energy not served per incident. Therefore, NTDC could not achieve acceptable reliability levels:

Year	Loss of Supply Incidents (Nos.)	Average ENS per Incident (MWh)	Average Duration per Incident (Hrs:Min)
2014-15	125	4264	01:12
2015-16	87	1644	02:24
2016-17	165	454	03:07
2017-18	142	3305	02:06

(iii) System Collapses and System Splitting:

The loss of supply incidents include 03 partial breakdowns and system collapse and 01 Grid Fault at Port Qasim during the year 2017-18. Chronological details of incidents for four years is shown in the following table. The record shows that during FY 2017-18, no major system breakdown happened, however consistency in this parameter is the key and performance of NTDC system over next couple of years would be monitored to ascertain that.

No. of	2014-15	2015-16	2016-17	2017-18
inclucint	12-12-2014	15-01-2016	26-09-2016	03-11-2017
1	Partial system collapse	Partial system collapse	System splitting	Partial Breakdown
2	22-12-2014	21-01-2016	10-12-2016	01-05-2018
2	Splitting of network	Major system collapse	System splitting	Partial Breakdown
2	01-08-2015		11-12-2016	21-05-2018
5	Partial system collapse		System splitting	Partial system collapse
Л	01-08-2015		01-01-2017	27-06-2018
4	Partial system collapse		System splitting	Grid Fault at Port Qasim
F	21-10-2015		02-01-2017	
J	Partial system collapse		System splitting	
6	24-01-2015		03-01-2017	
0	Partial system collapse		System splitting	
7	25-01-2015		04-01-2017	
/	Partial system collapse		System splitting	
0	25-01-2015		21-05-2017	
0	Partial system collapse		System splitting	
0	25-01-2015		28-05-2017	
9	Partial system collapse		Isolation of KEL from NTDC	
10	25-01-2015		30-05-2017]
10	Partial system collapse		Isolation of KEL from NTDC	

3.12.1.3 SYSTEM FREQUENCY

Rule 8 of Performance Standards (Transmission) Rules, 2005 prescribes limits for frequency. The frequency data as reported by NTDC indicated variation in frequency limits beyond the permissible limits of \pm 1%. A gradual improvement in this area has been observed:

(i) NTDC System Frequency

Year	Number	of times Frequence outside the Limit	Time duration the Frequency remained outside the Limits			Maximum Continuous period of Deviation		
	In a year	Average/month	Average/day	days	hours	% of year	hours	Minutes
2014-15	1264	105	3.500	10.430	250.33	2.860	2.48	149
2015-16	248	21	0.700	1.600	37.90	0.430	1.50	89
2016-17	35	2.9	0.096	0.175	4.20	0.048	0.25	15
2017-18	25	2.1	0.068	0.171	4.10	0.047	0.18	11

(ii) NTDC Monthly Highest System Frequency (Hertz)

Month	2013-14	2014-15	2015-16	2016-17	2017-18
July	50.20	50.71	50.75	NIL	50.55
August	50.31	50.68	50.69	50.72	50.56
September	50.22	50.55	50.69	50.60	50.56
October	50.35	50.69	50.53	NIL	NIL
November	50.30	50.62	50.62	NIL	NIL
December	50.28	58.63	50.71	50.63	NIL
January	50.70	54.69	51.47	50.68	50.64
February	50.63	49.49	NIL	50.65	NIL
March	50.63	50.65	50.64	50.61	50.54
April	50.68	50.66	NIL	50.63	50.56
May	50.60	50.69	NIL	50.65	50.62
June	50.57	50.68	49.49*	50.64	50.60

* cannot be validated

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tty ATDC Monthly Lowest System Frequency (Hertz)									
Month	2013-14	2014-15	2015-16	2016-17	2017-18				
July	49.05	48.74	49.07	NIL	50.51 [*]				
August	49.15	48.91	49.15	49.36	50.51 [*]				
September	49.35	48.93	49.19	50.51*	50.51 [*]				
October	49.50	48.99	49.21	NIL	NIL				
November	49.31	48.83	49.22	NIL	NIL				
December	49.15	45.00	49.32	49.44	NIL				
January	48.67	45.00	45.00	49.37	NIL				
February	48.87	49.06	NIL	50.53*	NIL				
March	48.92	49.11	50.52	50.51*	NIL				
April	48.89	49.02	NIL	49.32	NIL				
May	49.20	49.20	NIL	50.52*	NIL				
June	49.19	50.51	49.35	50.51*	NIL				

(iii) NTDC Monthly Lowest System Frequency (Hertz)

* Data was provided for only three months.

3.12.2 K-Electric Limited:

KEL has submitted its APR for the FY 2017-18, under Performance Standards (Transmission) Rules, 2005. The same has been analyzed and following main observations have been noted:

3.12.2.1 SYSTEM RELIABILITY

(i) System Duration of Interruption (Hrs/Point):

This KPI shows the average duration of outage an interconnection point observes during a year and it remained 0.48 Hrs in the year 2017-18 as shown in the accompanying figure. This indicates a 52.5% decrease in average outage duration per interconnection point as compared to preceding year.



(ii) System Frequency of Interruption (Nos./Circuit):

It indicates the average number of outages at a circuit during a year. As shown in the figure it remained 0.24 in the year 2017-18 (20% decrease with respect to preceding year).



3.12.2.2 SYSTEM SECURITY (i) Energy Not Served (ENS) (MWh):

This KPI shows the estimates of the total ENS as a result of loss of supply incidents during the year. KEL could not show any noticeable improvement on this index. Similarly loss of supply incidents slightly reduced however average ENS per incident increased.



(ii) Loss of Supply Incidents, Average ENS per Incident and Average Duration per Incident

Year	2014-15	2015-16	2016-17	2017-18
Loss of Supply Incidents (Nos.)	10	10	10	8
Average ENS per Incident (MWh)	545.9	481	285	323.1
Average Duration per Incident (Hrs:Min)	01:06	01:00	00:43	00:25

3.12.2.3 SYSTEM FREQUENCY

(i) Monthly Highest System Frequency (Hertz)

KEL has not reported any frequency deviations for 9 months of FY 2017-18.

Month	2013-14	2014-15	2015-16	2016-17	2017-18
July	51.15	50.58	50.60	50.60	N/A
August	51.70	50.64	Nil	Nil	N/A
September	51.70	50.51	Nil	Nil	N/A
October	51.69	50.53	Nil	Nil	N/A
November	51.93	50.55	0	Nil	N/A
December	51.68	50.82	50.60	Nil	N/A
January	51.15	50.54	50.70	50.60	50.90
February	51.10	50.51	Nil	Nil	N/A
March	51.91	50.58	Nil	Nil	N/A
April	51.28	50.51	Nil	Nil	50.60
May	51.06	50.57	50.60	50.60	50.60
June	51.72	50.52	Nil	Nil	N/A

(ii) Monthly Lowest System Frequency (Hertz)

KEL reported no frequency violations in FY 2017-18.

Month	2013-14	2014-15	2015-16	2016-17	2017-18
July	48.61	48.97	49.40	Nil	N/A
August	48.68	49.10	49.40	Nil	N/A
September	48.73	49.13	49.40	Nil	N/A
October	48.80	49.18	49.40	Nil	N/A
November	48.74	48.94	Nil	Nil	N/A
December	48.76	49.15	Nil	Nil	N/A
January	48.61	49.07	49.40	Nil	N/A
February	48.80	49.39	Nil	Nil	N/A
March	48.59	49.26	Nil	Nil	N/A
April	48.63	49.26	Nil	49.30	N/A
May	48.66	49.29	Nil	Nil	N/A
June	48.80	49.32	49.40	Nil	N/A

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PERFORMANCE OF DISTRIBUTION SECTOR

4.1 GENERAL

The unbundling of WAPDA through power sector reforms resulted in creation of ten (10) DISCOs fully owned by Federal Government. DISCOs are responsible for the operation and maintenance of the transmission and distribution assets at 132 kV and below. These include the following:

- (a) 26,847 km of 132 kV Transmission Lines,
- (b) 802 Nos. of 132 kV GSs with 2,025 PTs having transformation capacity of 50,535 MVA,
- (c) 8,850 Nos. of 11 kV Feeders, 328,375 km long,
- (d) 708,761 Nos. of Distribution Transformers having transformation capacity of 45,115 MVA and
- (e) 234,998 km of LT Lines.

In addition to above, KEL maintains and operates the following:

- (a) 338 km of 220 kV Transmission Lines,
- (b) 8 Nos. of 220 kV Grid Stations with transformation capacity of 3,080 MVA,
- (c) 767 km of 132 kV Transmission Lines,
- (d) 63 Nos. of 132 kV Grid Stations having transformation capacity of 6,062 MVA,
- (e) 1,729 Nos. of 11 kV Feeders, 9,549 km long,
- (f) 27,388 No. of Distribution Transformers having transformation capacity of 7,464 MVA and
- (g) 19,098 km of LT Lines.

4.2 TRANSMISSION AND DISTRIBUTION LOSSES OF DISCOS

The following table shows a five-year comparison of DISCOs' performance in the area of T&D losses. In the FY 2013-14, DISCOs reported actual losses of 18.72% whereas NEPRA set a target of 13.29% for DISCOs to bring efficiency in this area, while allowing them to invest as per their investment proposals to bring T&D losses down. However due to their inability to show any improvement the Federal Government, supported further increase in T&D losses so that DISCOs may have financial viability. Consequently, NEPRA allowed an increase of T&D losses to 15.72% in FY 2014-15 and further to 16.28% in FY 2015-16. NEPRA maintained same target losses for FY 2016-17 whereas the losses were revised to 16.15% for FY 2017-18, however DISCOs could not bring sustained improvements in their actual loss levels. The overall losses showed slight improvement in FY 2015-16 and FY 2016-17, however for FY 2017-18, DISCOs reported their actual losses at almost the same levels as they were in FY 2013-14. Even the better performing DISCOs were not able to reduce their losses over this period.

	2013-14		2014-15		2015-16		2016-17		2017-18	
DISCO	Allowed	Actual								
%										
PESCO	20.00	33.00	26.00	34.81	31.95	33.76	31.95	32.60	31.95	38.12
TESCO	18.50	23.00	22.31	21.41	20.00	18.96	20.00	15.40	12.47	12.47
IESCO	9.44	9.46	9.44	9.41	8.65	9.09	8.65	9.03	8.65	9.14
GEPCO	9.98	11.00	9.98	10.72	10.03	10.58	10.03	10.23	10.03	10.01
LESCO	9.01	13.40	11.75	14.10	11.76	13.94	11.76	13.77	11.76	13.83
FESCO	9.50	11.20	9.50	11.00	10.24	10.24	10.24	10.57	10.24	10.57
MEPCO	15.00	17.47	15.00	16.80	15.00	16.45	15.00	16.92	15.00	16.59
HESCO	15.00	26.47	20.50	27.08	22.59	26.46	22.59	30.63	22.59	29.88
SEPCO	17.00	38.56	27.50	38.17	29.75	37.87	29.75	37.90	29.75	36.68
QESCO	18.00	24.35	17.50	23.85	17.50	23.92	17.50	23.08	17.50	22.44
National Average	13.29	18.72	15.27	18.70	16.28	17.95	16.28	17.94	16.15	18.32

Source: DISCOs

Breakdown of allowed losses for FY 2017-18 in the following table shows that in addition to the technical losses, a margin for law and order has also been allowed to certain DISCOs, to account for practical difficulties to control theft and to overcome other issues:

DISCO		Losses (%)		Margin for	Total T&D
DISCOS	132 kV	11 kV	LT	Law and Order (%)	Losses (%)
PESCO	3.64	13.00	4.31	11.00	31.95
TESCO	2.65	9.	82	0.00	12.47
IESCO	1.71	4.99	1.95	0.00	8.65
GEPCO	1.51	5.34	3.18	0.00	10.03
LESCO	2.10	6.23	3.43	0.00	11.76
FESCO	1.85	6.95	1.44	0.00	10.24
MEPCO	3.13	8.41	3.46	0.00	15.00
HESCO	2.05	9.75	5.29	5.50	22.59
SEPCO	1.95	11.47	3.33	13.00	29.75
QESCO	4.00	8.12	2.88	2.50	17.50
TOTAL	2.45	11	.14	2.56	16.15

Source: DISCOs

4.3 RECOVERY POSITION OF DISCOS

The following table shows a comparison of recovery ratios for all the DISCOs for the two years.

											(%)
Year	PESCO	TESCO	IESCO	GEPCO	LESCO	FESCO	MEPCO	HESCO	SEPCO	QESCO	Overall DISCOs
2016-17	89.29	82.90	91.87	95.99	99.20	97.24	96.21	93.68	109.98	43.55	92.65
2017-18	88.60	66.61	89.75	96.07	95.93	97.93	94.58	75.41	59.72	25.01	87.71

Source: DISCOs

It may be observed that like T&D losses, overall recovery ratio has gone down relative to the previous year. The large DISCOs like LESCO, MEPCO, IESCO and PESCO have shown poor results in this area, whereas both HESCO and SEPCO have drastic reductions in collection efficiency. It is important to note that the above comparison is with the last year levels. The actual loss added to the circular debt would be relative to the allowed level of recovery ratio by NEPRA, which is set at 100%.

4.4 RECEIVABLES OF DISCOS

The overall receivables of all the DISCOs have increased by Rs. 166.26 billion which are considerably higher than the receivables of Rs. 45.82 billion during 2016-17. As on 30th June 2018, the overall distribution sector receivables stood at Rs. 896.15 billion whereas, the receivables at the start of this financial year were Rs. 729.89 billion. Following is a detailed break-up of receivables for the FY 2017-18:

Break-up of Receivables of DISCOs Financial Year ended June, 2018 (Rs. in Billion)

S.	Category	Receivables (FY ended	July, 2 to June	Receivables (FY ended							
INO.		June, 2017)	Billing	Collection	June, 2018)						
1	FEDERAL GOVERNMENT										
a)	Federal Governments Departments	0.59	14.05	13.36	1.445						
b)	Local Bodies under Federal Govt.	0.73	4.68	4.74	0.68						
c)	Autonomous Bodies under Fed. Govt.	1.84	7.45	7.10	2.20						
d)	Defence	0.19	18.05	17.48	0.77						
e)	W&P	1.55	1.76	1.21	2.10						
	Total (Federal Government)	4.88	45.98	43.88	7.20						

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S.	Category	Receivables (FY ended	July, Z to June	2017 , 2018	Receivables (FY ended
NO.		June, 2017)	Billing	Collection	June, 2018)
2	AJ&K GOVERNMENT				
i)	GoP Share	0.40	0.00	0.00	0.40
ii)	DISCOs Share	0.00	0.00	0.00	0.00
iii)	AJ&K Share	85.35	23.41	4.89	98.87
	Total (AJ&K)	80.75	23.41	4.89	99.27
3	PROVINCIAL GOVT. DEPTTS./AGENCIES				
a)	Punjab	1.63	25.34	23.82	3.21
b)	Khyber Pakhtunkhwa	19.65	6.27	6.29	19.50
C)	Sindh	1.35	18.64	13.91	6.13
d)	Balochistan	6.75	6.49	1.70	11.54
	Total (Provi. Govt. Depts./Agencies)	29.39	56.74	45.72	40.38
	TOTAL (1 TO 3)	115.02	126.13	94.49	146.84
4	FATA (DOMESTIC CONSUMERS)	22.18	13.88	9.21	26.85
5	AGRICULTURAL TUBE WELLS IN BALOCHISTAN				
i)	GoP Share	17.29	7.58	1.00	23.86
ii)	GOB Share	12.11	11.37	3.40	20.08
iii)	GST Subsidy Agri. Tube well Balochistan	0.12	0.00	0.00	0.12
iv)	Consumers Share @ Rs. 4,000/-	155.79	33.91	1.30	188.40
	Total (Agri. Tube wells in Balochistan)	185.30	52.86	5.70	232.46
6	PRIVATE (Including 4+5)	554.79	1,073.89	958.00	670.70
7	IPPS	0.01	1.26	0.87	0.21
8	K-ELECTRIC LIMITED	60.07	52.60	34.28	78.40
	GRAND TOTAL (3+6+7+8)	729.89	1,253.88	1,087.64	896.15

Source: PEPCO

During FY 2017-18, receivables of DISCOs from the Federal Government have increased by Rs. 2.32 billion as compared to FY 2016-17. The receivables of DISCOs from provincial governments of Punjab, Sindh and Balochistan have also increased in this financial year, whereas the receivables from Khyber Pakhtunkhwa have slightly decreased. In addition, FATA receivables from domestic consumers have increased from Rs. 22.18 billion in FY 2016-17 to Rs. 26.85 billion in FY 2017-18. The receivables from KEL in FY 2017-18 have increased by Rs. 18.33 billion. Therefore an overall governance issue is hurting DISCOs where they are not able to recover their dues from the Government (Federal and Provincial) as well as private consumers. Since Ministry of Energy (Power Division) is controlling DISCOs, therefore overall responsibility lies with the Federal Government for necessary steps for improvement.

4.5 CIRCULAR DEBT

Circular debt is a major issue confronting power sector. One of the contributors of circular debt is the high transmission and distribution losses in DISCOs. Failure of DISCOs to show any improvement in their actual level of losses viz-a-viz the Authority's allowed target resulted in an annual loss of around Rs. 46 billion based on the tariff that remained notified during the period under consideration i.e. FY 2017-18. It is pertinent to mention that notified weighted average T&D losses target for the FY 2017-18 was 15.92%, whereas DISCOs reported actual T&D losses for the same period remained around 18.32%.

Adding further to circular debt is the low recovery ratio of DISCOs. While setting the consumer-end tariff for DISCOs the Authority considers 100% recovery percentage, however the actual reported recovery percentage of DISCOs, remained at around 87.71% for the year 2017-18 (as per DISCOs' Performance Statistics published by PEPCO). The impact of lesser recoveries viz-a-viz Authority's set target of 100% has resulted in an annual shortfall of around Rs. 147 billion. Here it is pertinent to mention that the Authority in the determined tariff for the FY 2015-16 notified with effect from March 22, 2018 also allowed write-offs amounting Rs. 24,339 million strictly on provisional basis to DISCOs subject to fulfillment of criteria laid

down in the determinations of DISCOs. In case DISCOs fail to fulfill the said criteria, provisionally allowed write offs, shall be adjusted back in the tariff in subsequent year.

4.6 INVESTMENTS OF DISCOS

The following table provides detailed statistics about the investment plans of all the DISCOs over a period of five (05) years. It is observed that on an overall basis, DISCOs were able to utilize around 80% of the investment allowed to them. DISCO-wise, only MEPCO had been quite consistent in using funds, whereas other DISCOs did not show required consistency for bringing sustained development of their systems.

						(Million RS.)
	Investment	2013-14	2014-15	2015-16	2016-17	2017-18
	Requested	7,760	7,962	8,969	8,359	10,050
	Allowed	6,549	7,962	7,622	8,366	9,610
PESCO	Actual	8,140	5,049	7,622	8,366	11,347
	Excess / (Less)	1,591	(2,913)	0	0	1,737
	%age	124.29	63.41	100.00	100.00	118.07
	Requested	542	613	1,013	971	770
	Allowed	542	613	1,013	971	770
TESCO	Actual	317	367	814	971	744
	Excess / (Less)	(225)	(246)	(199)	0	(26)
	%age	58.49	59.87	80.36	100.00	96.67
	Requested	10,752	8,506	13,243	16,473	6,719
	Allowed	7,700	7,823	11,918	10,090	6,719
IESCO	Actual	4,483	4,827	5,195	5,313	7,451
	Excess/(Less)	(3,217)	(2,996)	(6,723)	(4,777)	732
	%age	58.22	61.70	43.59	52.66	110.89
	Requested	5,989	5,058	5,644	4,040	3,518
	Allowed	4,561	5,058	2,892	2,775	3,200
GEPCO	Actual	5,005	2,147	2,892	2,775	1,617
	Excess/(Less)	444	(2,911)	0	0	(1,583)
	%age	109.73	42.45	100.00	100.00	50.55
	Requested	12,570	10,737	10,826	19,781	21,459
	Allowed	8,247	8,247	10,826	19,781	21,459
LESCO	Actual	4,820	7,338	8,050	9,758	12,081
	Excess/(Less)	(3,427)	(909)	(2,776)	(10,023)	(9,378)
	%age	58.45	88.98	74.36	49.33	56.30
	Requested	10,895	9,673	9,442	8,209	9,364
	Allowed	6,700	7,573	9,162	7,140	7,857
FESCO	Actual	1,864	3,285	6,621	8,033	3,502
	Excess/(Less)	(4,836)	(4,288)	(2,541)	893	(4,355)
	%age	27.82	43.38	72.27	112.51	44.57
	Requested	7,992	20,458	14,781	12,050	18,000
	Allowed	7,492	8,697	10,546	11,416	13,000
MEPCO	Actual	7,748	8,503	10,008	11,416	12,924
	Excess/(Less)	256	(194)	(538)	0	(76)
	%age	103.42	97.77	94.90	100.00	99.41
	Requested	5,765	6,423	5,935	3,759	7,309
	Allowed	3,895	4,993	3,067	4,729	5,500
HESCO	Actual	3,607	3,413	4,048	4,729	4,804
	Excess/(Less)	(288)	(1,580)	981	0	(696)
	%age	92.61	68.36	131.99	100.00	87.35

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	Investment	2013-14	2014-15	2015-16	2016-17	2017-18
	Requested	1,515	3,622	4,322	977	4,071
	Allowed	1,515	2,497	1,671	977	3,400
SEPCO	Actual	2,497	2,106	1,671	977	3,062
	Excess/(Less)	982	(391)	0	0	(338)
	%age	164.82	84.34	100.00	100.00	90.06
	Requested	3,600	3,956	7,580	6,311	13,577
	Allowed	3,600	3,956	4,300	3,080	8,000
QESCO	Actual	3,301	4,145	7,115	3,080	4,748
	Excess/(Less)	(299)	189	2,815	0	(3,252)
	%age	91.69	104.78	165.47	100.00	59.35
	Requested	67,380	77,008	81,755	80,930	94,837
	Allowed	50,801	57,419	63,017	69,325	79,515
TOTAL	Actual	41,782	41,180	54,036	55,418	62,280
	Excess/(Less)	(9,019)	(16,239)	(8,981)	(13,907)	(17,235)
	%age	82.25	71.72	85.75	79.94	78.33

4.7 OVERLOADING IN DISCOS' SYSTEM

Power delivery through DISCOs' networks mainly depends on the adequacy of three major components including power transformers (mostly 132/11 kV transformers), 11 kV feeders and finally the distribution transformers. The following tables provide a comparison of overloaded components in all DISCOs for FY 2016-17 and FY 2017-18:

4.7.1 Loading Position of Power Transformers:

On an overall basis, overloading on power transformers has reduced to 23.01% in FY 2017-18 from 30.28% in FY 2016-17. On DISCO-to-DISCO comparison, PESCO has more than 50% power transformers overloaded above 80%, followed by HESCO having more than 40% of transformers overloaded. Overloading in TESCO, SEPCO and QESCO is observed in the range of 30%-39% whereas in GEPCO and MEPCO it is in the range of 20%-29%. It is noted that IESCO improved the loading position as only 0.81% of its power transformers are loaded above 80% of their rated capacity. LESCO showed a slight improvement of 0.40% this year as compared to previous year.

DISCO	Total No. of Power Transformers		Total No. of Power Transforn	Over-Loaded ners (Above 80%)	Percentage of Total Over-Loaded Power Transformers (Above 80%)		
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18	
PESCO	230	236	113	125	49.13	52.97	
TESCO	36	38	14	14	38.89	36.84	
IESCO	202	248	24	2	11.88	0.81	
GEPCO	160	174	34	51	21.25	29.31	
LESCO	351	390	14	14	3.99	3.59	
FESCO	195	225	100	42	51.28	18.67	
MEPCO	282	292	75	65	26.60	22.26	
HESCO	119	121	59	49	49.58	40.50	
SEPCO	118	126	53	49	44.92	38.89	
QESCO	160	175	75	55	46.88	31.43	
Total	1,853	2,025	561	466	30.28	23.01	

Source: DISCOs

4.7.2 Loading Position of 11 kV Feeders:

On overall basis, overloading on 11 kV feeders has also decreased as 23.49% of the total feeders are loaded above 80% compared to 29.06% last year. On DISCO level, TESCO, PESCO, SEPCO and QESCO have high percentage of overloaded feeders, followed by MEPCO, LESCO, FESCO and HESCO.

DISCO	Total No. of 11 kV Feeders		Total No. of 11 kV Feeder	Over-Loaded s (Above 80%)	Percentage of Total Over-Loaded 11 kV Feeders (Above 80%)		
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18	
PESCO	946	1,012	485	412	51.27	40.71	
TESCO	199	207	199	207	100.00	100.00	
IESCO	1,058	1,068	27	25	2.55	2.34	
GEPCO	805	835	88	59	10.93	7.07	
LESCO	1,650	1,741	548	417	33.21	23.95	
FESCO	998	1,023	159	149	15.93	14.57	
MEPCO	1,241	1,324	433	373	34.89	28.17	
HESCO	479	502	121	69	25.26	13.75	
SEPCO	462	490	167	157	36.15	32.04	
QESCO	628	648	233	211	37.10	32.56	
Total	8,466	8,850	2,460	2,079	29.06	23.49	

Source: DISCOs

4.7.3 Loading Position of Distribution Transformers:

Overloading of distribution transformers decreased by 7.94% as compared to the previous year as detailed below. A number of DISCOs showed noticeable improvement in overloading of their distribution transformers. LESCO brought overloading of transformers from 30.13% in FY 2016-17 down to 2.80% in FY 2017-18. HESCO reported only 1.45% overloaded distribution transformers in FY 2017-18 from 9.28% in FY 2016-17. SEPCO also reduced its overloaded transformers, however surprisingly IESCO could not reduce its overloading which in fact increased to 7.88% from 6.19% during last year.

DISCO	Total No. of Distribution Transformers		Total No. of Distribution (Abov	Over-Loaded Transformers e 80%)	Percentage of Total Over-Loaded Distribution Transformers (Above 80%)		
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18	
PESCO	72,078	74,104	21,033	6,183	29.18	8.34	
TESCO	18,198	18,475					
IESCO	46,359	47,830	2,868	3,770	6.19	7.88	
GEPCO	61,661	64,344	1,475	1,741	2.39	2.71	
LESCO	100,718	105,185	30,350	2,950	30.13	2.80	
FESCO	100,276	104,058	1,843	392	1.84	0.38	
MEPCO	156,460	161,197	8,128	5,844	5.19	3.63	
HESCO	35,996	36,670	3,340	532	9.28	1.45	
SEPCO	35,875	37,562	7,424	3,736	20.69	9.95	
QESCO	55,770	59,336	8,873	7,094	15.91	11.96	
Total	683,391	708,761	85,334	32,242	12.49	4.55	

Source: DISCOs

4.7.4 **Province-wise Loading Positions:**

Province-wise statistics of overloading position for FY 2017-18 is shown in the following table:

Description	Punjab	Sindh	Khyber Pakhtunkhwa	Balochistan	Total
No. of 132 kV Grid Stations	518	124	91	69	802
Total No. of Power Transformers	1,329	247	274	175	2,025
Over-Loaded Power Transformers (Nos.)	174	98	139	55	466
Over-Loaded Power Transformers (%)	13.09	39.68	50.73	31.43	23.01
Total No. of 11 kV Feeders	5,991	992	1219	648	8,850
Over-loaded 11 kV Feeders (Nos.)	1,023	226	619	211	2,079

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Description	Punjab	Sindh	Khyber Pakhtunkhwa	Balochistan	Total
Over-loaded 11 kV Feeders (%)	17.07	22.78	50.78	32.56	23.49
Total No. of Distribution Transformers	482,614	74,232	92,579	59,336	708,761
Over-loaded Distribution Transformers (Nos.)	14,697	4,268	6,183	7,094	32,242
Over-loaded Distribution Transformers (%)	3.04	5.75	6.68	11.96	4.55

Source: DISCOs

FUEL PRICE ADJUSTMENT OF DISCOS 4.8

NEPRA as per its mandate protects the electricity consumers, by passing on any applicable adjustment on monthly basis on account of actual fuel costs. The following table shows a month-wise/unit (Rs./kWh) adjustment, passed on to the consumers during 2017-18:

Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
(1.71)	(1.82)	(2.19)	(2.25)	(3.11)	(2.98)	(3.24)	(2.29)	(1.89)	(0.69)	1.22	0.51
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Source: NEPRA

LOADING POSITION OF POWER TRANSFORMERS, 11 KV FEEDERS AND DISTRIBUTION 4.9 TRANSFORMERS IN K-ELECTRIC LIMITED SYSTEM

The following table provides overloading positions of overloaded components in KEL for FY 2016-17 and FY 2017-18:

	2016-17	2017-18
Total No. of Over-Loaded 11 kV Feeders (above 80%)	91	29
Percentage of Total Over-Loaded 11 kV Feeders (above 80%)	5.51	1.68
Total No. of Over-Loaded Power Transformers (above 80%)	57	48
Percentage of Total Over-Loaded Power Transformers (above 80%)	41.30	32.65
Total No. of Over-Loaded Distribution Transformers (above 80%)	551	478
Percentage of Total Over-Loaded Distribution Transformers (above 80%)	2.15	1.75

It is noted that more than 32% power transformers of KEL are overloaded in FY 2017-18, whereas in FY 2016-17 approximately 41% power transformers were operating above 80% of their rated capacity. Improvements are also noted in the loading position of 11 kV feeders and distribution transformers relative to the previous year.

RECOVERY POSITION OF K-ELECTRIC LIMITED 4.10

The following table shows KEL's recovery position for different consumer categories. The overall recovery ratio of 91% has slightly improved over the last year ratio of 90%. The recovery position in domestic sector has also improved from 82% in FY 2016-17 to 84% in FY 2017-18, however considering the share of domestic sector (47%) in the overall billing, the recovery in domestic sector needs to be increased further:



	Amount of	Billed Units	Amount Re	alized and %age	Recovery to Bi	lled Amount			
Category	(Rs. in	Million)	(Rs. in	Million)	(%)				
	2016-17	2017-18	2016-17	2017-18	2016-17	2017-18			
Domestic	98,081	104,499	80,477	87,998	82.05	84.21			
Commercial	42,156	43,613	39,786	41,650	94.38	95.50			
Industrial	58,224	60,656	60,479	61,789	103.87	101.87			
Agricultural	1,419	1,296	351	343	24.74	26.47			
Public Lighting	3,482	2,809	1,045	1,066	30.01	37.95			
Bulk Supply	8,418	9,009	8,532	9,146	101.35	101.52			
Others	170	266	172	264	101.18	99.25			
Total	211,950	222,148	190,842	202,256	90.04	91.05			

Recovery Position of K-Electric Limited (2016-17 and 2017-18)

Source: KEL

4.11 PERFORMANCE UNDER NEPRA STANDARDS

4.11.1 DISCOs Performance under NEPRA Standards:

Following tables and graphs show the performance of DISCOs under different parameters for the year 2017-18 along with comparison of last four years:

System Average Interruption Frequency Index (SAIFI-No.):

DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
PESCO	316.45	315.40	261.65	160.60	170.10
IESCO	0.05	0.036	0.03	0.029	0.04
GEPCO	10.53	10.41	35.44	3.26	30.97
LESCO	78.04	52.49	45.79	37.44	32.92
FESCO	35.40	46.54	32.41	39.99	38.87
MEPCO	201.53	177.61	203.00	235.00	316.22
HESCO	229.93	202.33	184.00	188.40	180.74
SEPCO	251.48	227.96	216.71	601.37	568.59
QESCO	144.95	112.58	107.00	96.92	95.18

Source: DISCOs



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DISCO	2013-14	2014-15	2015-16	2016-17	2017-18			
PESCO	27,946.60	27,934.98	24,927.12	14,643.00	16,222.79			
IESCO	1.66	0.10	0.82	0.79	0.73			
GEPCO	13.14	13.20	59.49	55.03	53.67			
LESCO	4,759.61	3,010.29	2,926.29	5,595.63	4,338.23			
FESCO	1,137.02	2,682.58	1,714.00	1,532.04	1,951.38			
MEPCO	17,704.58	15,677.65	17,592.00	20,411.32	26,822.35			
HESCO	16,678.66	10,642.74	12,623.00	12,799.12	12,292.57			
SEPCO	2,442.73	2,141.36	1,879.37	5,666.01	4,397.44			
QESCO	11,868.07	7,506.81	7,290.00	8,310.40	8,287.90			

System Average Interruption Duration Index (SAIDI-Minutes):

Source: DISCOs



Timeframe for New Connections (%):

DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
PESCO	9.57	3.20	3.60	4.20	2.23
IESCO	0.00	0.00	0.00	0.00	0.00
GEPCO	15.24	8.60	8.60	12.35	18.79
LESCO	13.00	5.24	9.95	5.77	5.23
FESCO	27.70	25.30	19.80	34.70	15.94
MEPCO	15.80	9.15	5.70	5.14	5.28
HESCO	11.86	3.30	0.00	0.00	0.03
SEPCO	9.00	13.80	1.23	1.27	4.30
QESCO	1.08	12.50	20.30	20.40	1.31

Source: DISCOs

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Average Daily Load-Shedding (Hrs.):

DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
PESCO	4.80	2.50	2.30	3.20	3.25
IESCO	5.00	4.00	3.43	3.33	3.13
GEPCO	3.20	4.00	4.00	3.25	11.00
LESCO	3.50	2.33	1.67	2.00	1.70
FESCO	7.25	4.33	3.50	3.23	0.74
MEPCO	10.00	4.25	3.20	3.35	1.30
HESCO	3.75	4.00	3.33	4.50	3.75
SEPCO	2.00	1.00	1.00	2.25	2.25
QESCO	10.50	3.40	2.83	3.88	5.80

Source: DISCOs



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DISCO	2013-14	2014-15	2015-16	2016-17	2017-18		
PESCO	43,787	37,704	38,635	19,564	6,812		
IESCO	6,457	5,710	6,508	6,890	6,352		
GEPCO	3,325	3,744	3,906	5,071	5,485		
LESCO	25,504	8,363	17,631	10,887	3,303		
FESCO	9,169	9,223	10,488	4,127	4,572		
MEPCO	0	0	0	0	0		
HESCO	1,743	681	186	201	212		
SEPCO	0	0	0	1,033	1,734		
QESCO	4,022	144	4,273	4,355	4,541		
Total	94,007	65,569	81,627	52,128	33,011		

Nominal Voltage (Number of consumers who made complaint about voltage):

Source: DISCOs



Consumer Service Complaints (No.):

DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
PESCO	104,812	102,859	103,983	441,951	99,729
IESCO	66,739	62,167	63,831	46,587	43,504
GEPCO	1,123,731	841,178	826,226	824,816	820,260
LESCO	1,163,927	227,596	1,548,464	1,245,699	6,231,274
FESCO	248,241	392,399	353,019	496,176	464,662
MEPCO	93,198	91,373	73,296	74,869	48,425
HESCO	45,794	5,696	56,602	61,925	62,269
SEPCO	12,051	8,857	8,516	9,085	28,900
QESCO	50,811	41,952	5,198	52,211	68,876
Total	3,418,814	2,231,563	3,520,196	5,928,587	7,867,899

Source: DISCOs
National Electric Power Regulatory Authority

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Safety (No. of Fatal Accidents for both Employees and Public):

DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
PESCO	20	29	23	20	10
IESCO	12	15	19	15	20
GEPCO	12	15	12	16	29
LESCO	35	24	24	29	21
FESCO	29	29	15	15	07
MEPCO	17	34	20	10	17
HESCO	14	22	24	3	15
SEPCO	45	34	17	20	17
QESCO	02	20	5	11	06
Total	192	226	172	147	142

Source: DISCOs



Fault Rate (Faults/km):

DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
PESCO	0.88	0.78	0.93	0.86	0.45
IESCO	4.65	2.62	7.20	1.41	8.52
GEPCO	21.58	3.12	2.97	3.04	3.04
LESCO	50.60	7.79	10.48	2.99	5.91
FESCO	2.20	1.78	1.99	1.64	1.11
MEPCO	2.81	2.72	3.35	4.06	5.82
HESCO	1.92	0.78	0.89	1.696	0.84
SEPCO	2.10	2.004	1.58	3.12	2.49
QESCO	0.835	0.59	0.53	0.49	0.48

Source: DISCOs



4.11.2 K-Electric Limited Performance under NEPRA Standards:

Following table and graphs show the performance of KEL under different parameters for the FY 2017-18 along with comparison of last four years:

Description	2013-14	2014-15	2015-16	2016-17	2017-18
System Average Interruption Frequency Index (SAIFI-No.)	24.71	22.21	20.52	19.60	17.55
System Average Interruption Duration Index (SAIDI-Minutes)	1,495.25	1,330.30	1,210.00	1,142.50	1,451.42
Timeframe for New Connections (%)	13.20	4.80	1.90	8.00	4.00
Average Daily Load-Shedding (Hrs.)	2.30	1.10	1.33	2.50	1.26
Nominal Voltage*	19,408	258	253	293	628
Consumer Service Complaints (No.)	509,510	457,486	481,061	2,675,268	1,966,269
Safety**	05	04	13	08	10
Fault Rate (Faults/km)	1.96	1.55	1.39	0.95	0.85

* Number of Consumers who made Complaint about Voltage. ** Number of Fatal Accidents for both Employees and Public. Source: KEL

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MONITORING OF THE SECTOR

5.1 GENERAL

In the following sections, details about monitoring and enforcement by NEPRA of its licensees and their compliance with the relevant rules and regulations, terms and conditions of the licence and other applicable documents are presented:

- (a) Based on the performance analysis of public sector power plants and keeping in view the new generation capacity addition by year 2018, CEO of GENCO Holding Company Limited (GHCL) was directed to prepare a detailed plan of phasing out old/un-economical and un-serviceable generating units, which have completed their useful lives. Further actions are being considered by NEPRA under its relevant rules and regulations.
- (b) The analysis of public sector generation and evacuation of power from power plants showed underutilization of power plants. Concerns of the Authority in this respect were conveyed through various letters and directions to NTDC/NPCC about less generation and under-utilization of various power plants as well as delayed developmental works by NTDC. NTDC was directed for submission of detailed reports regarding under-utilization of various power plants and steps taken by it to mitigate the irritants causing non-operation of plants at maximum capacity.
- (c) Explanations were issued to public sector GENCOs about their excessive auxiliary power consumption and underutilization/reduction in net capacity of their generation facilities, poor maintenance of generation plants and equipment thereby violating the provisions of the Act and applicable documents etc.
- (d) NEPRA imposed a fine amounting to Rs. 01 million under NEPRA (Fines) Rules, 2002 on NTDC regarding under-utilization of power plants.
- (e) Various advisories were also sent to Ministry of Energy (Power Division), to ensure operation of economically higher ranked generation power plants at their maximum capacities and allocation of gas to power plants according to Economic Merit Order for effective utilization of the available generating sources. The Ministry of Energy (Power Division) was also advised to get the developmental works completed on war footing basis for removal of power dispersal issues and to avoid ongoing financial loss to the national exchequer due to underutilization of such power generation facilities.

5.2 PERFORMANCE EVALUATION REPORTS OF GENCOS:

5.2.1 Imposition of Fine on GENCOs:

Under NEPRA Performance Standards (Generation) Rules, 2009, every generation company is required to submit a Quarterly Performance Report (QPR) to NEPRA. The QPR is based on KPIs, particularly with respect to Reference Capacity, Planned/Unplanned Outage Hours, Availability Factor, Net Capacity Factor, Net Output Factor and Energy Availability Factor.

During the reporting period i.e. FY 2017-18, NEPRA also imposed fines on public sector GENCOs for excessive auxiliary consumption noted in previous years. Accordingly, after fulfillment of legal proceedings, a cumulative fine of Rs. 15 million was imposed as per following details:

GENCO	Amount of Fine (Rs.)	Date of Issuance of Order	Current Status
I	5 Million	January 11, 2018	Review was filed by GENCO-I, which was rejected by NEPRA vide Order dated 30-08-2018.
II	5 Million	January 11, 2018	Review was filed by GENCO-II, which was rejected by NEPRA vide Order dated 30-08-2018. Accordingly, Notice of Demand has been issued to GENCO-II on 08-10-2018.
	5 Million	January 11, 2018	Since, GENCO-III did not file the review motion timely, therefore, Notice of Demand was issued to GENCO-I on 19-03-2018 followed by a Recovery Request to District Collector on 01-06-2018.

5.3 MONITORING OF DISTRIBUTION SECTOR

5.3.1 <u>Review of Reliability Standards of DISCOs and Linkage with Investments:</u>

Initially, based on the repeated requests of distribution licensees, NEPRA set targets of SAIFI and SAIDI for the years 2015-16 and 2016-17 separately for each DISCO, which is 5% reduction over mean value of last five years data of SAIFI and 10% reduction over mean value of last five years data of SAIDI. The same exercise has been again initiated and all DISCOs and KEL have been required to provide the interruption data recorded automatically at their Power Distribution Centres (PDCs) for setting up the SAIFI and SAIDI targets for upcoming years.

5.3.2 Initiation of Legal Proceedings against Distribution Licensees:

5.3.2.1 Legal Proceedings against IESCO and Bahria Town:

Upon complaints of not carrying out load-shedding by IESCO in Bahria Town and adopting a discriminatory approach in this regard, NEPRA constituted a committee to visit IESCO and Bahria Town (Pvt.) Limited Offices on August 01, 2017 in order to check the actual status of load-shedding on 11 kV feeders from Bahria Town Grid Stations.

The Committee observed that IESCO did not install AMR meters at the 11 kV panels in Bahria Town Grid Stations. Moreover, the record obtained from the Power Distribution Center of IESCO did not reflect the load-shed as noted by Bahria Town Grid Staff in their log sheets.

Based on the report submitted by the team, NEPRA initiated legal proceedings against IESCO and Bahria Town (Pvt.) Limited, which are currently under process. As a result, AMR meters have been installed at all the 11 kV panels of Bahria Town Grid Stations.

5.3.2.2 Imposition of Fine on DISCOs:

In order to verify authenticity of data reported by DISCOs and monitor the compliance level of DISCOs with Performance Standards (Distribution) Rules, 2005 and Distribution Code, 2005 DISCOs were visited on regular basis. The visits not only included meetings with the senior management of DISCOs but random inspection of their field offices i.e. Sub-Divisions, Grid Stations, Complaint Offices and Power Distribution Centers as well. The following performance indices are evaluated for every DISCO:

- (a) Safety
- (b) Overbilling
- (c) Investment
- (d) Voltage level
- (e) Load-Shedding
- (f) Maintenance of Grid Stations
- (g) Timeframe for New Connections

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- (h) Delay in Restoration of Power Supply
- (i) Overloading of Power and Distribution Transformers
- (j) Verification of Data related to Complaints, as provided by a DISCO in its APR
- (k) Verification of Data related to Interruptions and their Duration, as provided by a DISCO in its APR

A comprehensive report has been also prepared during the reporting period. Based upon the nonsatisfactory performance of DISCOs, legal proceedings were initiated and after due legal process, fine was imposed on the DISCOs. The details of the legal proceedings and subsequent fine imposed on each DISCO is as under:

S. No.	DISCO	Amount of Fine	Date of Issuance of Order	Current Status
1		E Million	11 07 2017	Review was filed by HESCO, which was rejected by NEPRA vide
	пезсо		11-07-2017	Notice of Demand has been issued on 05-04-2018.
2	15660	4 4:11:	26.07.2017	Review was filed by LESCO, which was rejected by NEPRA vide
2	LESCO	4 Million	26-07-2017	Notice of Demand has been issued on 05-04-2018.
				Review was filed by GEPCO, which was rejected by NEPRA vide
3	GEPCO	4 Million	30-08-2017	Order dated 23-07-2018. Notice of Demand has been issued on 04-09-2018
				Review was filed by SEPCO, which was rejected by NEPRA vide
4	SEPCO	6 Million	01-11-2017	Order dated 23-07-2018.
				Notice of Definition file the review petition timely
5	FESCO	4 Million	12-06-2018	Notice of Demand has been issued on 06-07-2018.
6	IESCO	4 Million	-	Fine has been imposed vide RM 18-549, held on 02-10-2018.
7	PESCO	-	-	Hearing in the matter of Show Cause Notice issued to PESCO has been scheduled to be held on 24-10-2018.
8	MEPCO	-	_	A comprehensive site visit report has been prepared, which will soon be presented before the Authority.
	Total	27 Million		

5.4 MONITORING OF K-ELECTRIC LIMITED

5.4.1 <u>Visit of K-Electric Limited due to Unannounced Load-shedding owing to Gas Curtailment</u> by SSGC:

A NEPRA team of professionals visited KEL from April 11-13, 2018 to investigate the facts of unannounced load-shedding due to curtailment of gas supply by SSGC to KEL, owing to which consumers had to undergo lot of suffering.

Based on the report submitted by the committee, legal proceedings were initiated against KEL on account of its failure to commission KCCPP and BQPS-II on High Speed Diesel (HSD), despite the availability of all infrastructure, under-utilization of BQPS-I and carrying out additional load-shedding beyond its allowable limits.

Moreover, NEPRA also sent an advisory to the Federal Government for immediate restoration of gas supply of 190 MMCFD by SSGC to KEL. NEPRA also directed KEL to commission KCCPP and BQPS-II on HSD as soon as possible.

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The team held detailed discussions during its meetings with KEL officials, inspected main power generation plants and grid stations and conducted surveys of the relevant areas for response of general public. The committee made its recommendations on the following key areas:

- (a) Curtailment of gas by SSGC to KEL,
- (b) Utilization of available gas by KEL on its power plants,
- (c) Alternate arrangement of power generation in event of such eventuality,
- (d) Load-shedding and management of additional shortfall in power generation,
- (e) Future course of action.

The team observed that KEL received around 50 to 60 MMCFD less gas as compared to April, 2017. The team also noted that the situation became worse due to higher demand in April, 2018 compared to that in April, 2017. During gas shortage period, KEL operated its gas-based power plants while maintaining the efficiency and technical considerations about system stability in view. Therefore, a prudent operational regime was followed in this respect. For RFO based power plant at BQPS-I, the team noted inefficiency on KEL's part. Unit 2 which could produce 180 MW, had been put on long overhaul which came on bar on April 30, 2018. Similarly, Unit 6 was operated at 150 MW; around 30 MW lower than it's rated capacity. During the period under review i.e. March 27 till April 10, 2018 the Committee also noted underutilization of BQPS-I during the morning time, whereas it could have been operated at full capacity to minimize load-shedding. Furthermore, the team also visited the power plants and noted that infrastructure for HSD operations at both the gas turbine based power plants of KCCPP and BQPS-II was available. The operation on HSD was not integrated in the software control as claimed by KEL. In this regard, it was noted that as a prudent utility KEL should have commissioned its dual fuel options, and the responsibility rests with KEL that it had not made necessary arrangements to meet such eventualities. It was further noted that unannounced load-shedding had been carried out by KEL during 27 March to 10 April 2018, whereas KEL network also experienced faults adding to the unplanned load-shedding hours.

5.4.1.1 Conclusions and Recommendation:

- (a) The team concluded that in absence of a Gas Supply Agreement (GSA), the matter could only be decided at policy level as NEPRA cannot intervene in Fuel Supply Agreements (FSA). As a regulator of the power sector, however, NEPRA takes a very serious view of KEL's inability to meet such eventuality.
- (b) KEL also failed to foresee the critical situation developed during April, 2018.
- (c) KEL failed to provide a correct position about the load-shedding being carried out after the gas curtailment period began.
- (d) The team recommended that KEL should immediately make arrangements for commissioning its HSD based operations at BQPS-II and KCCPP. KEL was directed to furnish a detailed implementation schedule to the Authority in this respect.
- (e) KEL was directed to present before the Authority, any changes in tariff on account of HSD operations.
- (f) KEL was also directed to provide additional long-term solution to the issue.

5.4.2 <u>Rejection of K-Electric Limited's Force Majeure Claim:</u>

KEL requested NEPRA on August 29, 2017 to declare the period from August 29, 2017 to September 02, 2017 as "Force Majeure", in view of the weather warning issued by Pakistan Meteorological Department and Rehabilitation Department of Provincial Disaster Management Authority, Government of Sindh on August 28, 2017. In this regard, NEPRA required KEL on September 08, 2017, to substantiate its claim of "Force Majeure" in terms of the definition given in PSDR. In response, KEL submitted its reply vide letter dated September 18, 2017, however, failed to substantiate its above-mentioned claim. Accordingly, the request of

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KEL to declare the period from August 29, 2017 to September 02, 2017 as "Force Majeure", was rejected by NEPRA vide letter dated December 04, 2017.

In response, KEL vide letter dated January 29, 2018 filed a review motion against the determination of NEPRA, however, the same was also rejected by NEPRA vide Order dated September 28, 2018.

5.4.3 Installation of Automatic Meter Reading System in K-Electric Limited:

Pursuant to media reports, large area of Karachi remained without electricity due to tripping of more than 400 feeders during rainy season on 21-22 August, 2017 and onwards, which resulted in power supply outage in most areas of the Karachi. The Authority took serious notice of the power failure and directed KEL vide letter dated August 28, 2017 to immediately provide a detailed report on the matter.

In response, KEL vide letter dated September 15, 2017 submitted the report, upon which NEPRA constituted a team to visit KEL, in order to verify the feeder outage data submitted by KEL. The team visited KEL on 15-17 November, 2017 and observed that KEL has not yet completed the process of installation of AMR system for real time monitoring of power outages.

In view of above, NEPRA directed KEL to give a detailed presentation on this issue. Accordingly, the presentation was held, wherein, KEL has committed to complete the smart network and AMR system by June, 2019.

5.5 SAFETY ISSUES IN DISCOS AND KEL

NEPRA considers "Safety" as of paramount importance for gauging the performance of DISCOs and KEL. In this regard, NEPRA carried out a detailed study to determine the total number of fatal accidents occurred in DISCOs and KEL during last seven (07) years. It was noted that 1,169 fatal accidents occurred in DISCOs and KEL from July 01, 2011 to June 30, 2018, including 635 employees and 534 general public.

In view of above, NEPRA team visited LESCO and KEL to diagnose the fundamental causes of fatal accidents and to verify the implementation of Safety Standards as prescribed in PSDR, 2005 and Distribution Code, 2005 so that the target of Zero Fatal Accidents set by NEPRA may be achieved in this regard. NEPRA also initiated legal proceedings against KEL, on account of its failure to follow safety requirements as laid down in PSDR, 2005, resulting in occurrence of an electric shock to an eight years old boy, Muhammad Umer, the resident of Gulshan-e-Maymar, Karachi.

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INITIATIVES BY NEPRA

Following sections provide details of initiatives by NEPRA pursuant to its functions under the NEPRA Act:

6.1 WHEELING CHARGES OF DISCOS

NEPRA has already notified Wheeling regulations, which allow generation facilities to sell to BPC located in other DISCOs' territory. NEPRA has already determined wheeling charges at different voltage levels for facilitating intending stakeholders to undertake wheeling arrangement. The following table provides DISCO-wise details of the notified losses at different voltage levels and their corresponding wheeling charges:

	PESCO	TESCO	IESCO	GEPCO	LESCO	FESCO	MEPCO	HESCO	SEPCO	QESCO
Total Allowed Losses (%)	31.95	20.00	8.65	10.03	11.76	10.24	15.00	22.59	29.75	17.50
132 kV losses (%)	3.60	4.00	1.70	1.50	2.00	2.00	3.50	2.05	2.00	1.00
11 kV losses (%)	13.00	5.00	5.00	5.30	6.00	6.90	5.00	9.75	11.0	5.00
Loss at 132 kV and 11 kV (%)	16.40	9.00	6.70	6.80	8.00	8.90	8.50	11.80	13.00	6.00
Allowed Distribution Margin (%)	2.03	2.20	1.68	1.75	1.55	1.49	1.42	2.18	2.20	1.49
Adjustment Factor 132 kV (%)	23.00	51.00	16.00	34.00	29.00	29.00	23.00	16.00	17.00	29.00
Adjustment Factor 11 kV (%)	39.00	28.00	59.00	34.00	21.00	21.00	40.00	59.00	61.00	21.00
Adjustment Factor 11 kV & 132 kV (%)	62.00	79.00	75.00	68.00	52.00	52.00	63.00	75.00	78.00	52.00
UoSC at 132 kV (Rs./kWh)	0.33	0.94	0.25	0.54	0.40	0.40	0.29	0.28	0.27	0.36
UoSC at 11 kV (Rs./kWh)	0.62	0.52	0.95	0.57	0.31	0.30	0.51	1.10	1.06	0.27
UoSC at 132 kV & 11 kV (Rs./kWh)	1.02	1.53	1.23	1.15	0.77	0.76	0.83	1.43	1.39	0.68

Source: NEPRA

6.2 RATIONALIZATION OF GENERATION TARIFF PARAMETERS

As part of its regulatory process, NEPRA has initiated to review various tariff components for necessary changes. This aims to ensure that NEPRA approved power sector tariffs are consistent and reflective of prevailing economic and financial circumstances.

After a comprehensive review and discussions with various stakeholders, the Authority has decided to revise certain benchmarks and ceilings to be allowed for tariff components of generation projects. For bringing transparency to the tariff determination process, NEPRA notified the guidelines namely "NEPRA (Benchmarks for Tariff Determination) Guidelines, 2018" on 19th of June 2018. Following heads are considered by the Authority in the aforementioned guidelines:

KIBOR

- (a) This clause shall apply to cases where debt financing has been benchmarked against KIBOR.
- (b) In case of renewable energy projects eligible for securing debt financing under the Revised State Bank of Pakistan Financing Scheme for Renewable Energy, a flat rate of 6% shall be approved for debts with debt repayment periods not exceeding 12 years.
- (c) In case of hydropower projects with capacities up to 50 MW and construction periods exceeding two years, a spread not exceeding 2.5% over KIBOR shall be approved, on a case to case basis, with

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savings in the spread allowed to be shared between the power producer and power purchaser in the ratio of 60:40 respectively.

- (d) In case of hydropower projects with capacities over 50 MW and construction periods exceeding 3 years, a spread not exceeding 2.75% over KIBOR shall be approved.
- (e) In case of power projects securing non-banking financing, a spread ceiling lower than standard commercial banking spreads shall be approved, on a case to case basis, and the difference between the approved spread ceiling and the spread achieved by the project shall be shared equally between the power purchaser and power producer.
- (f) In case of power projects securing financing through Sukuk, a spread ceiling lower than standard commercial banking spreads shall be approved, on a case to case basis, with savings in the spread to be shared equally between the power producer and power purchaser.
- (g) In case of energy projects other than those specified above, a spread not exceeding 2.25% over KIBOR shall be approved, with savings in the spread to be shared between the power producer and power purchaser in the ratio of 50:50.

LIBOR

- (a) This clause shall apply to cases where debt financing has been benchmarked against:
 - (i) LIBOR;
 - (ii) a combination of LIBOR and KIBOR
- (b) In case of wind and solar power projects, a spread not exceeding 4.25% over LIBOR shall be approved, on a case-to-case basis.
- (c) In case of hydropower projects with capacities over 50 MW and construction periods exceeding 2 years, a spread not exceeding 4.60% over LIBOR shall be approved on case-to-case basis.
- (d) In case of power projects other than those specified above, a spread not exceeding 4.5% over LIBOR shall be approved on case to case basis.
- (e) In case of power projects with export credit insurance, the approved spread ceilings shall be reduced by 50 basis points.

Capital Structures

- (a) Capital structures for all energy projects shall be approved within the debt-equity ratio limits prescribed in Schedule-I of these guidelines.
- (b) Notwithstanding the foregoing, capital structures for all technologies, except hydel shall be approved on a 80:20 debt-equity ratio.

Provided that, in case of a formal requirement by a lender for a debt-equity ratio other than 80:20, the Authority may approve a capital structure within the debt-equity ratio limits prescribed in Schedule I of these guidelines.

Provided further that in case the Authority approves a debt-equity ratio other than 80:20, the return approved on equity shall be adjusted to maintain a WACC at the same level as under a 80:20 debt equity ratio capital structure.

(c) For Hydel Projects, Debt: Equity shall be approved in the range of 80:20 to 75:25.

Provided that, in case of a formal requirement by a lender for a debt-equity ratio other than 80:20 to 75:25, the Authority may approve a capital structure within the debt-equity ratio limits prescribed in Schedule I of these guidelines.

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Provided further that in case the Authority approves a debt-equity ratio other than 80:20 to 75:25, the return approved on equity shall be adjusted to maintain a WACC at the same level as under a 80:20 to 75:25 debt-equity ratio capital structure.

(d) In case of a capital structure with equity exceeding 30% of total capital cost, the Authority shall treat equity in excess of 30% of total capital cost, as a debt.

ROEDC and IDC

- (a) This clause shall apply to cost-plus tariffs.
- (b) The rates of ROEDC and IDC shall be approved by the Authority at the time of tariff petition, by way of a Reference Tariff, on the basis of justified equity injections and debt drawdown patterns submitted by the applicant.
- (c) In case of a material deviation between the rates of ROEDC and IDC approved by the Authority at the time of tariff determination and the actual rates achieved at COD, and where such deviations are not substantiated or justified, the Authority shall rationalize the tariff as per the equity injections and debt drawdown patterns approved at the time of tariff petition.

Financing Fees

- (a) This clause shall apply to debt financing through capex loans.
- (b) In case of hydropower projects with capacities up to 50 MW and construction periods exceeding three years, or power projects with new technologies, a financing fee not exceeding 2.5% of debt shall be approved.
- (c) In case of power projects other than those specified in sub-clause (b), a financing fee not exceeding 2.00% of debt shall be approved

Insurance

- (a) Insurance costs shall be approved as a percentage of EPC costs at rates prescribed in Schedule-II of these guidelines.
- (b) Average construction periods for each technology shall be as per the timelines prescribed in Schedule-II of these guidelines.
- (c) In case of technologies not specified in Schedule-II, insurance cost and average construction periods shall be approved by the Authority on a case to case basis.

Withholding Tax

Withholding tax on dividends shall not be allowed as a pass-through item in any technology.

These guidelines shall be applicable to all applications for tariff determination under the NEPRA Tariff (Standards and Procedure) Rules, 1998, and the NEPRA Up-front Tariff (Approval and Procedure) Regulations, 2011.

6.3 RATE OF RETURN REVIEW

NEPRA has decided to review the returns offered in the power sector and prepared a concept paper for determination of the rates of return for the power companies, which provided a basis for determining the IRR for various technologies, value chain of power sector i.e. generation, transmission and distribution and tariff regimes (cost plus, upfront). The basic objective is that the IRR now needs to effectively account for specific risks, return matrix and its adjustment for a particular technology. The consultative process has been started by the Authority on the following proposed returns.

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Tashualami	Propos	sed Term	Curren	t Return
rechnology	US\$ (%)	Eq. Rs. (%)	US\$ (%)	Eq. Rs. (%)
THERMAL				
Imported Coal	12.50	15.67	17.00	20.30
Imported Gas (RLNG)	13.25	16.44	15.00	18.24
Local Gas	14.00	17.21	15.00	18.24
Thar/Local Coal	14.00	17.21	18.00	21.33
Bagasse	14.00	17.21	15.00	18.24
RENEWABLE				
Solar/Wind	14.00	17.21	14.00	17.21
Small Hydro (Take or Pay)	14.25	17.47	17.00	20.30
Small Hydro (Take and Pay)	14.50	17.73	17.00	20.30
Large Hydro (Take or Pay)	15.00	18.24	17.00	20.30
Large Hydro (Take and Pay)	16.00	19.27	17.00	20.30

6.4 DEVELOPMENT OF POWER SAFETY CODE

As per requirements of Distribution and Grid Codes, all licensees shall have comprehensive approved Power Safety Code in place and available at all times. In this regard, after conducting meetings and getting input from transmission and distribution licensees, Power Safety Code was approved by NEPRA in 2015.

Based on the approved Power Safety Code, LESCO and MEPCO were directed to prepare their comprehensive safety manuals and the same will be shared with other DISCOs, so that a uniform document can be finalized. In this regard, detailed guidance has also been given to LESCO and MEPCO on the preparation of draft safety manual during number of joint meetings and interactive sessions held.

6.5 COMPREHENSIVE REDUCTION AND ELIMINATION OF POLYCHLORINATED BIPHENYLS (PCBS)

Ministry of Climate Change (MOCC) through National Project Director (NPD)-Persistent Organic Pollutants (POPs) Project approached NEPRA with the request, for arrangement of field visits to selected generation, transmission and distribution licensees of NEPRA, so that oil sampling may be carried out under their project, for checking presence of PCB contaminated oil in (i) Operational power and distribution transformers at various voltage levels (ii) PCBs dismantling facilities/transformer reclamation workshops (iii) Circuit Breakers etc. which were installed before year 2000.

The primary objective of field visits seeks to safeguard the disposal of large amounts of PCBs and prevent their release into the environment due to improper storage and the climatic conditions. The secondary objective is to upgrade the safety standards of transformer reclamation centers for the disposal of equipment and oil with PCBs, which will prevent the exposure of workers and the release of PCB into the environment.

The team comprising representatives from NEPRA, UNDP, POPs Project Team, 3rd Party contractor namely Bizexperts (involved in collection and transportation of POPs to disposal site i.e. Bestway Cement Plant in Kallar Kahar) and COMSATS University, visited following places for collection of oil samples:

S. No.	Licensee	Visited Places	Samples Taken From
1	GENCO-I	Generation Units	Operational Power Transformers
2	NTDC	220 kV Grid Station Kot Lakhpat	Oil Storage Tank
		Transformer Reclamation Workshop Lahore	Damaged Transformer, Repaired Transformer, Oil Storage Tank and Oil Treatment Tank

S. No.	Licensee	Visited Places	Samples Taken From			
2	DESCO	132 kV Sakhi Chashma Grid Station	Operational Power Transformers and Damaged Power Transformers			
5	PESCO	Transformer Reclamation Workshop Nowshera	Office time over			
4		132 kV Old Rawat Grid Station	Operational Power Transformer and Operational Oil Circuit Breaker			
4	IESCO	Transformer Reclamation Workshop Hassan Abdal	Damaged Transformers, Repaired Transformers, Oil Storage Tank and Oil Treatment Tank			
E	MEDCO	132 kV Grid Station Qasim Pur	Operational Power Transformer, Damaged Power Transformer and Oil Circuit Breaker			
5	MEPCO	Transformer Reclamation Workshop Multan	Damaged Transformer, Repaired Transformer, Oil Storage Tank and Oil Treatment Tank			
G	HESCO	132 kV Kotri Grid Station	Operational Power Transformers and Damaged Power Transformers			
0		Transformer Reclamation Workshop Hyderabad	Damaged Transformers, Repaired Transformers, Oil Storage Tank and Oil Treatment Tank			
7	K-Electric	Centralized Transformer Reclamation Workshop SITE Baldia Town	Damaged Transformer, Repaired Transformer, Oil Storage Tank and Oil Treatment Tank			
8	KANUPP	Security Clearance not granted	Security Clearance not granted			
0	Tarbala	Generation Units	Operational Power Transformers			
9	Tarbela	Store	Waste Oil Drums			
		Generation Units	Operational Power Transformers			
10	Mangla	Grid Station	Operational Power Transformers			
10	Plangta	Plant Site	Oil Storage Tank			
		Spill Ways	Operational Distribution Transformers			
11	Pakistan Steel	Plant Site	Damaged Transformers & Power Transformers			

National Project Manager (NPM) forwarded detailed test reports dated 08 August, 2018 as prepared by COMSTAS University of Information Technology, Abbottabad (Independent Laboratory) for consideration and record. In addition, NPM of POPs also requested NEPRAs' support regarding continuation of sampling and testing process so that other POPs/PCBs contaminated locations in the power sector may be identified.

Test results show that most of the samples taken from the selected locations are POPs/PCBs contaminated. The Independent Laboratory also highlighted the details of organic chemicals, which are harmful for humans and the environment.

6.6 FORMATS FOR SUBMISSION OF INFORMATION FOR GENERATION COMPANY

In order to streamline the submission of requisite information by power generation companies in line with already specified formats in respect of DISCOs (for filing of generation tariff petitions) the Authority has prepared the standardized formats. As a first step, keeping in view the comments of the stakeholders the formats for steam turbine based power plants operating on coal, gas, RFO, biomass, bagasse, solid waste and nuclear fuel have been prepared which were notified on March 15, 2019 and are available on NEPRA website. Following are the details of the forms that are required to be submitted with petitions for determination of generation tariff under Rule 3 of the NEPRA (Tariff Standards and Procedure) Rules, 1998.

Form 1 General Information of the Power Plant (This form includes basic information of the power plant)

Form 2 Breakup of Project Cost (This form includes information related to EPC cost, Non EPC cost, Capital cost and Project cost of the power plant)

- Form 3 Breakup of capital cost for Coal, RFO, Gas, Bagasse, Biomass, Solid Waste and Nuclear fuel based projects (This form includes information related to Power island, Civil works and Balance of Plant etc.)
- Form 4 Detailed Breakup of Non EPC and Project Development Costs (This includes form includes information related to Project development and management cost along with other Non EPC cost)
- Form 5 Selection of EPC Contractor / Selection of O&M Contractor (This form includes information related to bidding details of EPC & O&M contractors)
- Form 6 Financing Assumptions (This form includes information related to Capital structure)
- Form 7 Technical Assumptions (This form includes information related to capacity and efficiency calculations)
- Form 8 Plant Characteristics for Coal, RFO, Gas, Bagasse, Biomass, Solid Waste and Nuclear fuel based projects (This form includes information related to detailed operational characteristics of the power plant)
- Form 9 Breakup of Annual O&M Expenses (This form includes information related to Fixed and Variable O&M)
- Form 10 Calculation of IDC (This form includes information related to calculation of IDC)
- Form 11 Calculation of ROE (This form includes information related to calculation of ROE)
- Form 12 Comparison with Similar Technology National and International Plants (This form includes information related to comparative analysis)
- Form 13 Calculation of Working Capital (This form includes information related to calculation of working capital)
- Form 14 Debt Service Schedule (Typical for Local Currency) (This form includes information related to debt servicing schedule)
- Form 15 Reference Tariff Table (Fuel, Open Cycle) (This form includes information related to Reference tariff table)

6.7 COAL PRICING WORKING – HIRING OF CONSULTANT

NEPRA had started the process of hiring a private consultation for handling the coal price adjustments of three 1,320 MW of coal projects based on imported coal. The need to hire a consultant for coal price adjustment had arisen from the fact that there is no regulatory mechanism for coal pricing and import verification process unlike, gas and LNG prices, which are determined by the Oil and Gas Regulatory Authority or set by Oil Making Companies in case of Oil. In response to NEPRA's advertisement in the matter, Argus Media (a Singapore based Consulting Services Company) showed interest to offer consultation services to NEPRA. The Authority approved the selection of Argus Consulting Services on 20 December, 2017. Argus Consulting Services highlighted the following issues and submitted a set of recommendations:

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Timing: Month Average of the Bill of Lading Month versus Prior Month

To ensure that there is no time inconsistency and that the benchmark price employed represents the purchase price of coal, The Argus Consulting Services recommended that there was a need to ensure that NEPRA's practice, i.e. using the month average of the b/l date in the tariff determination, be employed.

Potential new indices (Country of Origin)

The index prices, for import of coal from Australia, Indonesia and South Africa, are used as benchmark. In the instance that coal imported from other countries such as Russia, Colombia, etc, the FOB price benchmarks that are published and used by market participants will be used as the basis for NEPRA's Tariff Determination.

Potential new indices to be introduced in NEPRA's tariff assessment toolkit (based on calorific value)

Given the non-linearity in price of thermal coal as a function of calorific value, NEPRA has the right to change the underlying price benchmark of coal for its tariff calculation in the instance that the calorific value of the coal procured is below a floor limit.

Issues Pertaining to Marine Freight

(i) <u>Time Charter Rate</u>

The informational constraints and the regulatory burden that will be imposed if freight charges are to be verified, preclude a straightforward assessment of the freight rates. Nevertheless, in the absence of a transparent freight index for Supramax vessels from South Africa, Indonesia and Australia to Pakistan, it is recommended that the current model used by NEPRA be employed.

(ii) Bunker Price

If it can be proven that 180 CST bunker is used to fuel the vessels, via the submission of a bunker delivery note, then the Argus Durban MGO and 180 CST prices will be used as price benchmarks. If the verification is not possible, the MGO and 380 CST prices at Fujairah will be used as the pricing basis. The timing would be month average in the b/l month.

Marine Insurance

The current practice by NEPRA to collect the premium invoice should be continued.

Handling Loss

The current practice by NEPRA, which is to compensate the buyer for losses of 2%, ought to be reviewed. Argus advises a number of 1% to be used.

Port Handling Charges

NEPRA should use the lowest of the port submission charges submitted to it in a month. This will incentivize the use of more cost-effective means of handling cargoes at the port and using the cheapest facilities available.

Customs Duties and Cess

The current practice by NEPRA to collect the requisite receipts and quantities should be continued.

L/C Charges

In order to incentivize economically sound practices and skirt informational constraints, NEPRA should use the lowest L/C submission rate in a given month as the basis for the tariff calculation.

PDA Charges

In order to incentivize economically sound practices and skirt informational constraints, NEPRA should use the lowest PDA submission rate in a given month as the basis for the tariff calculation.

The Authority principally agreed with the recommendations as mentioned above under each head.

6.8 WIND AND SOLAR PV POWER GENERATION

6.8.1 <u>Benchmark Tariff/Competitive Bidding for Wind Power Projects:</u>

The Authority announced Benchmark Levelized Tariff on January 27, 2017 for induction of wind power generation through competitive bidding by the relevant agencies. According to that decision, the relevant agencies were required to develop Request for Proposal (RFP) for NEPRA's approval. However, till expiry of that tariff in January, 2018, RFP was not submitted to NEPRA by any agency and the process of competitive bidding could not be initiated.

6.8.2 Tariff Determination of Solar PV Projects:

The Authority processed the following tariff petitions of solar PV power projects under NEPRA Tariff (Standards and Procedure) Rules, 1998 and issued determination accordingly:

S. No.	Name of Company	Installed Capacity (MW)	Tariff Approved (US Cents/kWh)
1	Zorlu Solar Pakistan (Pvt.) Limited	100	5.3086
2	Gharo Solar (Pvt.) Limited	50	5.6073
3	HNDS Energy (Pvt.) Limited	50	5.2622
4	Meridian Energy (Pvt.) Limited	50	5.2622
5	Helios Power (Pvt.) Limited	50	5.2622
	Total	300	

6.8.3 <u>Reconsideration Requests:</u>

NEPRA issued decisions on Reconsideration Requests filed by Federal Government in respect of following companies:

S. No.	Name of Company	Installed Capacity (MW)	Tariff Approved (US Cents/kWh)
1	Reconsideration request of Federal Government in the matter of Access Electric (Pvt.) Limited	10.00	5.9419
2	Reconsideration request of Federal Government in the matter of Access Solar (Pvt.) Limited	11.52	5.9419

6.8.4 <u>Review Motion:</u>

On March 03, 2017, the Authority decided to adopt the regime of competitive bidding for the induction of solar PV power projects. Zhenfa Pakistan New Energy Company and Zonergy Company Limited filed review motions against that decision requesting the Authority to announce upfront tariff for solar PV power. During the period under review, the Authority decided those review motions while dismissing them and maintaining its decision of not announcing another upfront tariff for solar PV projects. In the review motion, the Authority also decided that solar PV power projects may consider filing tariff petition under NEPRA Tariff (Standards and Procedure) Rules, 1998 subject to submission of all the requisite documents under the said rules.

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6.8.5 <u>Revised Tariff Decision of FFC Energy Limited:</u>

NEPRA issued revised decision of FFC Energy Limited due to reduction in interest rate in financing facility resulting decrease in its levelized tariff by Rs. 0.0823/kWh.

6.8.6 Under Process Cases:

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Following tariff cases of wind and solar PV projects were admitted by the Authority under NEPRA Tariff (Standards and Procedure) Rules, 1998 during the review period, which were under processing till June, 2017. Details of these cases are as hereunder:

S. No.	Name of Company	Installed Capacity (MW)	Technology
1	Zhenfa Pakistan New Energy Company (Pvt.) Limited	100.00	Solar
2	Siachen Energy Limited	100.00	Solar
3	Shaheen Renewable Energy 1 (Pvt.) Limited	51.00	Wind
4	Master Green Energy (Pvt.) Limited	50.00	Wind
5	Western Energy (Pvt.) Limited	50.00	Wind
6	Lakside Energy (Pvt.) Limited	50.00	Wind
7	Artistic Wind Power (Pvt.) Limited	50.00	Wind
8	Act 2 Wind (Pvt.) Limited	50.00	Wind
9	Din Energy Limited	50.00	Wind
10	Gul Ahmed Electric Limited	50.00	Wind
11	Metro Wind Power Limited	60.00	Wind
12	Indus Wind Energy Limited	50.00	Wind
13	Liberty Wind Power 1 (Pvt.) Limited	50.00	Wind
14	Liberty Wind Power 2 (Pvt.) Limited	50.00	Wind
15	NASDA Green Energy (Pvt.) Limited	50.00	Wind
16	Tricom Wind Power (Pvt.) Limited	50.00	Wind
17	Trans Atlantic Energy (Pvt.) Limited	48.30	Wind
18	Burj Wind Energy (Pvt.) Limited	13.80	Wind
	Total	973.10	

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INITIATIVES BY STAKEHOLDERS

7.1 GRID CODE REVIEW

7.1.1 Grid Code Addendum-I for Grid Integration of Wind Power Plants:

In order to resolve the issues regarding reactive power and "black start" capability of Wind Power Plants at the time of integration, the Grid Code Review Panel (GCRP) administered by NTDC, took up the issues and a number of meetings of the GCRP were held. Grid Code Addendum-I for grid integration of Wind Power Plants was approved by NEPRA in April, 2010.

To determine the limit of renewable (wind and solar) resources onto national grid, a study was carried out by M/s GOPA-International Energy Consultant. GOPA recommended some modifications to the existing Grid Code Addenda to accommodate the planned renewable (wind and solar) projects onto the national grid. The same were deliberated in GCRP meetings and accordingly, the Grid Code Addendum I (Revision-1) for grid integration of wind power plants was approved by NEPRA in July, 2017.

The addendum allows integration of Wind Power Plants to National Grid/DISCO systems up to a maximum total power, limited to a value that does not deteriorate the overall quality of power of Grid Systems beyond international IEC Standards. Initially, this upper limit is set to be equal to 5% of the total grid-connected installed power (MW) capacity. The process of future projects integration will be carried out as per planned capacity of respective future years.

7.1.2 Development of Grid Code Addendum-II for Solar Power Plants:

Keeping in view the growing trend of Solar Power Plants to cope with the maximum power demand in country and to facilitate the investors, there is a need of Code of Conduct for integration of Solar Power Plants into the national grid based on specific study. In this regard, number of letters were exchanged with NTDC, a number of GCRP meetings were attended by NEPRA professionals and finally, Grid Code Addendum-II for integration of Solar Power Plants was approved by NEPRA and issued to all concerned stakeholders in June, 2014. In this addendum, the sizing and siting of a solar park was to be carefully determined in view of techno-economic viability of grid interconnection and radiance levels.

In light of M/s GOPA studies, the Draft Grid Code Addendum-II (Revision-1) for grid integration of Photovoltaic (PV) and Concentrated Solar Power (CSP) Plants has been submitted by NTDC. The same is currently being reviewed by NEPRA.

7.2 DISTRIBUTION CODE REVIEW

For implementation of Distribution Code, NEPRA conducted a workshop/seminar, wherein Distribution Code Review Panel (DCRP) was established for the development of Distribution Code addenda such as integration of small hydel power plants, interconnection of distributed generators under net metering regime i.e. wind, solar and other power plant.

Accordingly, meetings are being held for addressing interconnection issues at distribution level specifically related to Renewable Energy Integration at distribution level through net-metering.

7.3 PPIB ROLE, PLANNED ACTIVITIES, PROGRESS AND ACHIEVEMENTS

The PPIB is "One Window" facilitator for the investors in the field of power generation on behalf of Government of Pakistan. PPIB is also processing public sector power generation projects in IPP model for providing incentives, concessions and facilitation by PPIB to these projects companies under the applicable policies as being provided to the IPPs in the private sector.

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PPIB is currently handling thirty-one (hydro, coal and RLNG) power projects of more than 20,500 MW, which are located all across the country. PPIB is processing the most diversified portfolio of its history, which is a unique blend of indigenous Thar Coal, and hydro-based projects while less expensive imported coal and RLNG based projects are also included. PPIB is fully determined in providing maximum facilitation to these projects in removing bottlenecks for their smooth and effective implementation. These projects are at different stages of development, some are in testing and commissioning phase, some are under construction, while others are under financial closing and pre-financial closing stages. In addition, PPIB is also implementing \pm 660 kV HVDC Matiari-Lahore Transmission Line Project with the collaboration of private sector "Policy Framework for Private Sector Transmission Line Projects, 2015".

The current portfolio of projects being handled by PPIB includes 15 projects of 6,258 MW cumulative capacity are hydro based projects, 12 projects of 9,373 MW are based on coal while 4 projects of 4,896 MW are based on RLNG. From the said portfolio, two coal based projects of 2,640 MW, two RLNG based projects of 2,410 MW and one hydro based project of 147 MW have achieved COD while another project of 1,223 MW based on RLNG is also completed and in the process of declaring COD which is expected during July, 2018.

PPIB is also leading institution of the GOP in implementing multibillion dollars flagship CPEC initiative by processing major chunk of power generation projects of 10,934 MW and a transmission line project. These projects are also included in the overall portfolio of projects currently being processed by PPIB. Break up of CPEC based projects is as follows:

- (a) Nine coal based power projects of 8,220 MW (two projects commissioned, three under construction, two under FC, one under Tariff Determination while one is under issuance of LOI)
- (b) Three hydropower projects of 2,714 MW (two under construction, one under FC)
- (c) and a 4,000 MW Load carrying Matiari-Lahore Transmission Line Project (under FC Construction activities also started)

PPIB is also facilitating the provinces and investors in development of small hydropower projects under tripartite LOS regime. In this regard, PPIB has already signed facility agreements with the Governments AJK, Punjab and Khyber Pakhtunkhwa. This initiative will attract and encourage potential investors in developing small to medium size hydropower projects, which will enhance power generation capacity and reduce burden on the national grid. In addition, economic activities around the projects, sites are also likely to witness a major increase.

During 2017-18, PPIB continued it's strive for inducting affordable power in the National Grid to overcome the electricity crises. The ultimate goal of PPIB is to make the system sustainable and reliable as power shortfalls are now getting under control with gradual inclusion of upcoming IPPs. PPIB is planning to advertise five hydro based IPPs of 1,000 MW in near future, which will further enrich national grid with affordable electricity. PPIB is already processing a Matiari-Lahore Transmission Line Project under CPEC; however another HVDC Transmission Line Project under CPEC is expected to be processed by PPIB. Furthermore, NTDC has also recently referred few transmission line projects to PPIB for ICB. PPIB will gear-up its efforts for improving transmission system as well.

Currently PPIB is implementing two robust policy frameworks carrying market competitive incentives and simplified procedures for the investors. "Power Generation Policy 2015" and "Policy Framework for Private Sector Transmission Line Projects 2015" have been launched to attract new investments for development of new power generation and transmission projects respectively.

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Year	Hy	del	Co	bal	RL	NG	Total	No. of
	MW	No.	MW	No.	MW	No.	(MW)	Projects
2017	147	1	2,640	2	3,633	3	6,420	6
2018	0	0	990	2	800	1	1,790	3
2019	102	1	990*	0	463*	0	1,555	1
2020	0	0	163	1	0	0	163	1
2021	720	1	3,270	6	0	0	3,990	7
2022	870	1	1,320	1	0	0	2,190	2
2025	1,824	2	0	0	0	0	1,824	2
2027	1,048	3	0	0	0	0	1,048	3
2028	548	1	0	0	0	0	548	1
	999	5	0	0	0	0	999	5
Grand Total	6,258	15	9,373	12	4,897	4	20,527	31

Table summarizing PPIB's portfolio of upcoming IPPs

* Includes 2nd Units of Projects from previous year. Source: PPIB

Highlights of some major activities/achievements of PPIB during FY 2017-18 for developing Pakistan's power sector are as follows:

- (a) First coal based power project under the CPEC i.e. 1,320 MW Sahiwal Power Project by Huaneng Shandong Ruyi, China achieved COD on 28-10-2017.
- (b) Another coal based power project under CPEC i.e. 1,320 MW Port Qasim Power Project by Sinohydro, China/Almirqab, Qatar achieved COD on 25-04-2018.
- (c) Two RLNG based Power Projects i.e. 1,180 MW Bhikki and 1,230 MW Haveli Bahadur Shah achieved COD on 20th May and 9th May, 2018 respectively.
- (d) Another RLNG based 1,223 MW Balloki Power Project has also completed construction work at site while formal declaration of COD in progress which is also expected to be done during July, 2017.
- (e) Pakistan's 2nd hydro IPP i.e. 147 MW Patrind Hydropower Project has also achieved COD on 08-11-2017.
- (f) LOI and LOS issued to 1,263 MW RLNG based project by Punjab Thermal Power (Pvt.) Limited on 26-07-2017 and 26-01-2018 respectively.
- (g) China Power Hub Generation Company (Pvt.) Limited achieved financial close on 07-12-2017 for 1,320 MW project being established at Hub, Balochistan. Prior to this, project sponsors have already started construction activities from its own equity to meet the COD date of August, 2019. This project is being implemented by PPIB under the CPEC framework.
- (h) 660 MW Lucky Power Project at Port Qasim achieved financial close on 25-06-2018 thereafter project has entered in construction phase.
- (i) PPIB issued LOS to Pakistan's first private sector Matiari-Lahore Transmission Line Project on 04-08-2017. This project is being implemented by PPIB under the CPEC framework.

7.4 AEDB EFFORTS IN SUPPORTING RENEWABLES ENERGY PROJECTS

7.4.1 <u>Net-Metering:</u>

In order to maximize the utilization of ARE technologies, NEPRA announced NEPRA (Alternative and Renewable Energy) Distributed Generation and Net Metering Regulations, 2015 on September 1, 2015. These regulations provide the framework for implementing net-metering installations using solar and wind generation of upto 01 MW capacity. The first net-metering system of 01 MW capacity was installed at the Parliament House, Islamabad which has opened the door for net-metering based systems in all parts of the country.

For mass deployment of net metering based systems, the Federal Government has recently taken several steps including simplifying the process of acquiring generation licence and other approvals/permissions and shortening the time period required for the same and making the whole process hassle free for the consumers. AEDB has initiated certification of service providers/vendors/installers of solar net-metering systems under AEDB (Certification) Regulations, 2018 in order facilitate the consumers and DISCOs and at the same time ensure quality of service and equipment. The service providers are be obligated to complete all the requirements for setting up net-metering based installations on behalf of the consumer and provide best quality equipment to the consumers. As of June, 2018, 43 companies had been enlisted as certified service providers/installers for net-metering systems.

7.4.2 IFC Lighting Pakistan Program:

Lighting Asia/Pakistan program aims at helping address the lighting needs of consumers and give access to low-cost, high-quality, safe, reliable and cleaner lighting products. The target is to enable 1.5 million people have access to modern energy services for lighting and associated services. The framework of program includes:

- (a) Quality Assurance
- (b) Market Intelligence
- (c) Business-to-Business Connections
- (d) Consumer Awareness

Partners to the program are IFC, AEDB, Micro-Financing Institutes, International Manufacturers and Local DISCOs. The program has till to date focused remote areas of Sindh Province and Southern Punjab. So far, Lighting Pakistan program has reached the following milestones since its inception:

- (a) 150,000 products sold
- (b) 750,000 people reached
- (c) Eight manufacturing associates found local distributors

7.5 OBJECTIVES, PROGRESS, ACHIEVEMENTS, PLANNED ACTIVITIES OF DIRECTORATE OF POWER DEVELOPMENT SINDH, ENERGY DEPARTMENT, GOVERNMENT OF SINDH

- (a) To provide, "One-Window" facility to the investors in the private power sector in the province and to interact with all other stakeholders, departments/organization related with establishment of power generation projects (all types up to 50 MW).
- (b) Development of 2x50 MW gas fired power projects SNPC-I and SNPC-II under Public Private Partnership Mode. COD has been achieved on January, 2018 of both projects. Both projects are successfully running and adding electricity of 100 MW in the power system and thereby contributing in national economy.
- (c) Development of 5x20 MW solar power projects of various locations in Sindh under Public Private Partnership Mode. This projects completion become in 2020.
- (d) The MOU signing between Energy Department, Government of Sindh and KEL for soalrization of CM House held on 01-08-2017, which has been also completed.
- (e) To liaise with the concerned local and international agencies for facilitating and expediting the power development projects in public as well as private sector in the province.
- (f) To assist private sectors investors for obtaining consents and licenses from various agencies of the local governments, the Provincial Governments and the Government of Pakistan.
- (g) To assist the NEPRA, in determining and approving the tariff for new power projects.
- (h) To device strategy for creating employment opportunities in power sector.

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- This office notified as a focal department of National Energy Efficiency and Conservation Authority (NEECA) Act, 2016. PC-I namely "Energy Efficiency and Conservation Programme Sindh" is prepared for FY 2018-19.
- (j) Promote efficient use of energy, which will be critical in reducing the stress on expansion of energy supplies and on the environment. This will be complemented by energy conservation and demand management measures.
- (k) Creating awareness and promotion to create a culture of energy conservation.
- (l) Training and development of engineers in the domain of energy conservation and efficiency.
- (m) Monitoring and evaluation of the energy efficiency programme.
- (n) To promote energy audit culture in the province.

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MISCELLANEOUS

8.1 SUMMARY OF ACTIVITIES DURING 2017-18

The following sections provide summary of various activities by NEPRA during 2017-18 and also includes brief information on the Board of Directors Meetings for GENCOs, NTDC and DISCOs.

8.1.1 <u>Amendments in NEPRA Act/Rule(s)/Regulation(s):</u>

The following New Amendments have been made in the existing Act, Rules and Regulations during the reporting period:

S. No.	Name of Rule/ Regulation/Guideline	Notified Vide SRO No./Date	Salient Features
1	Amendment in Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997	No. F. 22(23)/ 2017-Legis. dated 30-04-2018	 (a) Establishment of Appellate Tribunal (Addition of Section 12A to 12K) (b) National Electricity Policy and Plan (Addition of Section 14A) (c) Cessation of Generation Licence (Addition of Section 14B) (d) Introduction of Captive Generation (Addition of Section 14C) (e) Introduction of Provincial Grid Company (Addition of Section 18A and 18B) (f) Segregation of Sale Business from Network/wire Business of DISCOs (Amendment in Section 21) (g) New Market Participants introduced through: i) Market Operator (Section 23A) ii) Electric Power Trader (Section 23C) iii) Electric Power Supplier (Section 23E) iv) System Operator (Section 23G) (h) Enforcement and Investigation Proceedings (Addition of Section 31(4)] (j) Establishment of District level Complaint Offices (Addition of Section 35A)
2	Amendment in NEPRA (Review Procedure) Regulations, 2009	SRO 870(I)/2017 dated 31-08-2017	Amendments in Regulation 3, and insertion of new Schedule for Fees for Filling Review Motion
3	Amendment in NEPRA (Alternative and Renewable Energy)	SRO 1025(I)/2017 dated 10-10-2017	Amendment in Sub-Regulation (1) of Regulation 2.
4	Distributed Generation and Net Metering Regulations, 2015		Amendments in Regulation 2, 3, 4, 7, 14, and in Schedule-I, II and III.
5	Amendment in NEPRA Upfront Tariff (Approval & Procedure) Regulations, 2011	SRO 236(I)/2018 dated 13-02-2018	Amendments in Regulation 4 and Schedule V.
6	Amendment in NEPRA (Interconnection for Renewable Generation Facilities) Regulations, 2015	SRO 730(I)/2018 dated 07-06-2018	Amendments in Regulation 1, 2, 3 and Schedule II and insertion of new Regulation 2A, 3A and Schedule III.

8.1.2 Advisories issued by NEPRA to the Government of Pakistan:

S. No.	Date	Subject	Sent to
1	06-06-2018	Role and Functions of Pakistan Electric Power Company	Ministry of Energy
2	08-06-2018	Poor Performance of Public Sector GENCOs	(Power Division)

Source: NEPRA

8.2 CONSUMER AFFAIRS

8.2.1 Status of Consumer Complaints (July, 2017 – June, 2018) (Head Office):

DISCO	Total Complaints	Total Complaints	Under
Disco	Received/Processed	Disposed Of	Process
PESCO	245	233	12
TESCO	3	1	2
IESCO	172	162	10
GEPCO	77	69	8
LESCO	212	197	15
FESCO	168	160	8
MEPCO	643	618	25
HESCO	628	613	15
SEPCO	339	328	11
QESCO	10	5	5
KEL	531	479	52
BTPL	1	1	0
WAPDA	4	3	1
NTDC	3	1	2
Total	3,036	2,870	166

Source: NEPRA

8.2.2 <u>Status of Consumer Complaints (July, 2017 – June, 2018) (Regional Offices):</u>

Regional Office	DISCO	Total Complaints Received/Processed	Total Complaints Disposed Of	Under Process
	GEPCO	70	62	8
Labora Offica	LESCO	788	660	128
Lanore Office	FESCO	78	71	7
	MEPCO	338	320	18
	HESCO	124	122	2
Karachi Office	SEPCO	103	90	13
	KEL	2,996	2,957	39
Peshawar Office	PESCO	529	297	232
Quetta Office	QESCO	0	0	0
Total		5,026	4,579	447

Source: NEPRA

8.2.3 <u>Major Activities/Developments:</u>

On recommendations of the National Assembly's Standing Committee on Cabinet Secretariat, the Authority has approved the establishment of five (05) additional offices of NEPRA at DISCOs' Headquarter level, i.e. at Gujranwala, Faisalabad, Multan, Hyderabad and Sukkur, along with staff, in addition to strengthening the exiting offices at Karachi, Lahore, Peshawar and Quetta.

8.3 GENCO'S BOARD OF DIRECTORS (BODS) MEETINGS

The public sector GENCOs are governed by their respective BODs. BODs are responsible for heading organizational meetings to discuss and take decisions on administrative, procurement, policy and network improvement matters. The details of the attendance record and main agenda items of BOD meetings during

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FY 2017-18 in respect of GENCO-III and IV, except for GENCO-I and II who have not provided information, are as follows:

S. No.	GENCO	Number of BODs Meetings held during the FY 2017-18
1	GENCO-III	10
2	GENCO-IV	08

8.3.1 <u>Attendance of Members during BODs Meetings of Northern Power Generation Company</u> <u>Limited (NPGCL) (GENCO-III):</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Prof. Dr. Tabrez Aslam Shami	Chairman BOD	10	00
2	Mr. Nadeem Ahmad	Ex-CEO/Director	02	00
3	Mr. Ali Asghar Qureshi	CEO/Director	08	00
4	Mr. Muhammad Umar Khan	Director	10	00
5	Mr. Muhammad Irfan Akram	Director	10	00
6	Mr. Muhammad Zargham Eshaq Khan	Director	03	07
7	Mr. Muhammad Anwer Sheikh	Director	06	04
8	Mr. Muhammad Akram	Director	10	00
9	Mr. Abdul Qayyum Malik	Director	10	00
10	Mr. Muhammad Imran Mian	Director	10	00

8.3.1.1 Main Agenda Items of BODs Meetings of GENCO-III:

- (a) Implementation status of long term O&M Agreement with M/s HEPSEC at CCPP, Nandipur.
- (b) Discuss, deliberate, finalize and approve the Vision and Mission Statements of the Company.
- (c) Proposal for adjustment of surplus staff of defunct and closed NGPS, Piranghaib, Multan and GTPS, Shahdara, Lahore
- (d) Approve the extension in the validity period of Interim RLNG supply agreement between NPGCL and SNGPL for CCPP, Nandipur.

8.3.2 <u>Attendance of Members during BODs Meetings of Lakhra Power Generation Company</u> <u>Limited (LPGCL) (GENCO-IV):</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Salim Ahmed Mughal	Chairman BOD	08	00
2	Mr. Muhammad Hassan Chang	Ex-CEO/Director	02	00
3	Mr. Ghulam Shabir Jatoi	Ex-CEO/Director	03	00
4	Mr. Ghulam Qadir Memon	CEO/Director	03	00
5	Engr. Abdul Malik Memon	Director	08	00
6	Mr. Muhammad Irfan Akram	Director	08	00
7	Mr. Danish Iqbal	Director	05	03
8	Mr. Muhammad Imran Mian	Director	08	00

8.3.2.1 Main Agenda Items of BODs Meetings of GENCO-IV:

- (a) Approval of Business Plan for Rehabilitation of LPGCL after incident of July 20, 2017.
- (b) Approval of Business Plan for Installation of 110 MW New Power Plant at Lakhra.

8.4 NTDC'S BOARD OF DIRECTORS MEETINGS

8.4.1 <u>Attendance of Members during BODs Meetings of National Transmission and Despatch</u> <u>Company Limited (14 BOD's Meetings held during the FY 2017-18):</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Babar Iqbal	Chairman	11	03
2	Mr. Zafar Abbas	Managing Director/Director	14	00
3	Mr. Ghiasuddin Ahmed	Director	13	01
4	Mr. Mahfuz-ur-Rehman Pasha	Director	13	01
5	Mr. Nasir Gulzar	Director	14	00
6	Mr. Shah Jahan Mirza	Director	11	03

8.4.2 Main Agenda Items of BODs Meetings of NTDC:

- (a) Award of Contract for Supply of ACSR Drake Conductor and EHS Galvanized steel wire for 500 kV D/S Quad Bundle T/Lines from Domeli to 500 kV Gakkhar substation.
- (b) Award of Contract for Procurement of 220 kV and 132 kV T/Line Material for Power Evacuation from Wind Clusters.
- (c) Award of Contract for Design, Fabrication and Supply of 132 kV Towers.
- (d) Award of Contract for Procurement of 500 kV Grid Station hardware under ADB Loan for Power Transmission Enhancement Investment Program Tranche-IV.
- (e) Approval for SOPs of Blacklisting of Contractors.
- (f) Approval for Procurement of Individual Environment Expert to Monitor the Environment Safeguard Matters of ADB funded Tranche-III and IV Sub-Projects under MFF-I.
- (g) Approval for Procurement of Individual Social and Resettlement Expert to monitor the social safeguards matters of ADB funded Tranche-III and IV Sub-Projects under MFF-I.
- (h) Award of additional works to disburse power from Balloki Power Plant for Design, Supply, Installation, Testing and Commissioning of Plant and Equipment for new Lahore 500/220 kV substations.
- (i) Approval for PC-I for Evacuation of Power from Suki Kinari, Kohala and Mahi Hydropower Projects in Northern Areas.
- (j) Award of Contract for Procurement of Material for Interconnection for proposed 1200 MW RLNG based Power Plant at Trimmu District Jhang.
- (k) Award of Interfacing/Integrated Work of DCS and SCADA system at Ghazi Barotha Powerhouse to M/s General Electric Grid Solution.
- (l) Award of Contract for Civil Works, Erection, Stringing, Testing and Commissioning of 500 kV T/Line to be financed under MFF 2nd Power Transmission Enhancement Investment Program Tranche-I.
- (m) Approval for PC-I for Implementation of Integrated Solution to Improve Productivity and Control in NTDC by ERP system.
- (n) Award of Contract for Civil Works, Erection, Stringing, Testing and Commissioning of two 220 kV D/C T/Line from RLNG Power Plant, Trimmu Head Works, Jhang to 220 kV G/S Toba Tek Singh.
- (o) Approval for Construction of 500 kV HVDC T/Line for Evacuation of Power from 2x660 MW Thar Coal based SSRL/SECL Power Plant.
- (p) Approval for Procurement of 11.5/0.415 kV Pad Mounted Transformers (ALT-III) and 500 kV Substation Earthling Materials through shopping under ADB Loan.
- (q) Award of Contract for Civil Works, Stringing, Testing and Commissioning of 500 kV D/C Quaid Bundle T/Line from HUBCO Power Plant to existing 500 kV G/S Jamshoro.
- (r) Award of Contract for Procurement of $550/\sqrt{3}$ kV, 3×37 MVAR Shunt Reactors.
- (s) Award of Contract for Procurement of NTDC SMS Software and its implementation for 3 to 5 years on Turnkey basis with the Financial Assistance of USAID.

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- (t) Approval for interlinking of 220 kV Dharki, RYK, Bahawalpur and Chishtian G/Ss by Construction of 220 kV T/Line.
- (u) Approval for Extension and Amendment in Syndicated Term Finance Agreement to Rs. 17 billion for Construction of Neelum Jhelum T/Line Project.
- (v) Award of Contract for Civil works, Erection, Stringing, Testing and Commissioning of 500 kV S/C Quad Bundle Guddu-Muzaffargarh T/Line.
- (w) Award of Contract for Procurement of Material for 500 kV D/C Quad Bundle T/Line from 1,320 MW Port Qasim Power Plant to Matiari.
- (x) Award of Contract for Procurement of Material (Disc Insulators) for 500 kV D/C Quad Bundle T/Line from Hub Power Plant to Jamshoro substation.
- (y) Award of Contract for Procurement of Material for 220 kV D/C Twin Bundle T/Line from Tarbela to Burhan.
- (z) Award of Contract for Construction of 132 kV D/C T/Line includes Construction of Pile Foundations, Erection of Towers, Stringing, Testing and Commissioning to connect Tanaga WPP to Hydro China WPP by connecting with 220 kV Gharo-Jhampir T/Line.

8.5 DISCO'S BOARD OF DIRECTORS (BODS) MEETINGS

The DISCOs are governed by their respective BODs except for TESCO, which is yet to have a governing body. BODs are responsible for heading organizational meetings to discuss and take decisions on administrative, procurement, policy and network improvement matters. The details of the attendance record and main agenda items, discussed in BOD meetings during FY 2017-18, are discussed here in respect of all DISCOs except for LESCO who has not provided information:

S. No.	DISCO	Number of BODs Meetings held during the FY 2017-18		
1	PESCO	09		
2	TESCO	Power of BODs rest with MD-PEPCO since 2010.		
3	IESCO	17		
4	GEPCO	12		
5	FESCO	13		
6	MEPCO	14		
7	HESCO	13		
8	SEPCO	06		
9	QESCO	07		

8.5.1 <u>Attendance of Members during BODs Meetings of Peshawar Electric Supply Company</u> <u>Limited (PESCO):</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Arsallah Khan Hoti	Chairman BOD	09	00
2	Mr. Shabir Ahmed	CEO/Director	06	03
3	Mr. Ahmed Dildar	Director	08	01
4	Mr. Zulfiqar Ahmad	Director	09	00
5	Sardar Muhammad Tariq	Director	04	05
6	Mr. Tahir Bin Yamin	Director	07	01
7	Mr. Nasir Khan Musazai	Director	06	02
8	Mr. Muhammad Naeem Khan	Director	04	05
9	Dr. Aamer Ahmed	Director	07	02
10	Mr. Zaka Ullah Khan	Director	01	02
11	Engr. Dr. Muhammad Amjad Khan	Director	02	00
12	Muhammad Salim Khan	Director	01	00

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8.5.1.1 Main Agenda Items of BODs Meetings of PESCO:

- (a) Establishment of 132 kV Grid Station at Puran, Tehsil Martung, District Shangla.
- (b) Procurement of HT/LT Structures, Conductor and Transformers.
- (c) Authorization of filing of Tariff Petition in NEPRA for the FY 2016-17, 2017-18 instead of multi-year tariff petition FY 2016-17 to FY 2021-22.
- (d) Procurement of 3,300 km LT Aerial Bundled Cable 95 mm, 5 core (3x95+1x70+1x25) and 500 km LT Aerial Bundled Cable 50 mm, 5 core (3x50+1x35+1x25).
- (e) Procurement of 1,000 Nos. 50 kVA Distribution Transformers.
- (f) Procurement of 11,698 Nos. HT Steel Structure 34-8" and 14,786 Nos. LT Steel Structure 30-8".
- (g) PESCO SOP for the processing of Distributed Generation/Net Metering Applications.
- (h) Procurement of 1,154 No. 50 kVA Transformer.
- (i) Procurement of 2,077 km ACSR DOG Conductor and 4,282 km ACSR RABBIT Conductor.
- (j) Procurement of 2,068 km ACSR OSPREY Conductor and 5,826 km AAC ANT Conductor.
- (k) Procurement of 3,300 km Aerial Bundled Cable 95 mm² 4 core and 500 km Aerial Bundled Cable 50 mm² 4 core.
- (l) Procurement of 200,000 Nos. Single Phase Static Energy Meter.
- (m) Eradication of Kunda Culture in PESCO.
- (n) Creation of Martung and Chakalsar Sub Office under Division-II Swat Circle.
- (o) Bifurcation of Bannu Circle and creation of D.I. Khan Circle.

8.5.2 <u>Attendance of Members during BODs Meetings of Islamabad Electric Supply Company</u> <u>Limited (IESCO)</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Mohammad Nadeem Khan	Ex-Chairman BOD	03	01
2	Mr. Saad Ullah Khan	Chairman BOD	13	00
3	Mr. Basit Zaman Ahmed	CEO/Director	17	00
4	Mr. Naeem Iqbal	Director	17	00
5	Mr. Muhammad Iqbal Ratyal	Director	04	00
6	Syed Ghazanfar Abbas Jilani	Director	05	12
7	Mr. Raheel Ijaz	Director	09	08
8	Mian Ayyaz Afzal	Director	04	00
9	Prof. Dr. Niaz Ahmed Akhtar	Director	03	01
10	Miss Ayla Majid	Director	01	03
11	Mr. Tallat Mahmood	Director	01	03
12	Dr. Aamer Ahmed	Director	10	03
13	Mr. Shahyar Chishti	Director	10	03
14	Sardar Ahmed Ayaz Sadiq	Director	07	06
15	Syed Ikhlaq Ahmed	Director	13	00
16	Mr. Zafeer Abbasi	Director	13	00
17	Mr. Nadeem Aslam Chaudhary	Director	07	06

8.5.2.1 Main Agenda Items of BODs Meetings of IESCO:

- (a) Procurement of 25 kVA, 50 kVA, 100 kVA and 200 kVA Pole Mounted and 200 kVA Pad Mounted Distribution Transformers.
- (b) Procurement of Single Phase Static Meters.
- (c) Procurement of ACSR Osprey, Rabbit and AAC Ant Conductor.
- (d) Procurement of 150 km 8.7/15 (17.5) kV 4/0 AWG (120mm²), 3 core Cable and 200 km of PVC (37/0.83) 4 core cable.
- (e) Approval for Construction of 132 kV T/Line from Hattian to Bagh on Turnkey Basis.
- (f) Purchase of HT (34ft 8in) and LT Steel Structures (30ft 8in).
- (g) Approval of Bid for Construction of Transformer Reclamation Workshop at 132 kV Grid Station Rajjar.

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- (h) Procurement of 9,000 HT PCC and 9,000 LT PCC Spun Hollow Poles.
- (i) Approval of adoption of SOPs for Environmental and Social Safeguard in IESCO.

8.5.3 <u>Attendance of Members during BODs Meetings of Gujranwala Electric Power Company</u> Limited (GEPCO):

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Ghiasuddin Ahmed	Chairman BOD	12	00
2	Mr. Muhammad Zahid Saleem	CEO/Director	09	00
3	Mr. Mujahid Aslam Billah	Ex-CEO/Director	01	00
4	Mr. Muhammad Akram	Ex-CEO/Director	02	00
5	Cap. (Rtd.) Muhammad Asif	Director	00	03
6	Mr. Zafar Abbas	Director	12	00
7	Lt. Col. (Rtd.) Shah Jahan Khan	Director	09	03
8	Mr. Muhammad Anwar Sheikh	Director	10	02
9	Mr. Afzaal Bhatti	Director	00	05
10	Mr. Rizwan Faiz Muhammad	Director	05	00
11	Mr. Khalid Ishaq	Director	05	00
12	Mr. Afzaal Ahmed Gondal	Director	00	03
13	Prof. Dr. Farhat Saleemi	Director	09	03
14	Mr. Akhlaq Ahmad Syed	Director	07	00
15	Mr. Ahmad Ayaz Sadiq	Director	03	01
16	Mr. Saaadullah Khan	Director	05	02
17	Mr. Shaheryar Chishty	Director	07	00

8.5.3.1 Main Agenda Items of BODs Meetings of GEPCO:

- (a) Procurement of 500 km AAC Wasp, 3600 km ACSR Rabbit and 600 km ACSR Osprey Conductor.
- (b) Procurement of 2500 km PVC 2/C 10 mm².
- (c) Approval of Tender for Erection and Stringing Work regarding Re-conductoring of 132 kV D/C Mandi Bahauddin from Head Faqiran to Phalia T/Line from LYNS to Greely Conductor.
- (d) Procurement of 15,000 Nos. 11 kV Steel Cross Arms and 49,500 Nos. 11 kV Pin for Steel Cross Arms.
- (e) Procurement of 210,000 Single Phase and 30,000 Three Phase Static Meters.
- (f) Procurement of 2,500 km ACSR Rabbit Conductor.
- (g) Procurement of 1,300 Nos. 25 kVA, 950 Nos. 50 kVA, 1,575 Nos. 100 kVA and 1,265 Nos. 200 kVA Distribution Transformers.
- (h) Procurement of 07 Nos. 132/11.5 kV, 31.5/40 MVA Power Transformers.
- (i) Approval of Tender regarding Procurement of SPA, SPD and SPG Steel Tubular Poles.
- (j) Procurement of 1,500 Nos. HT Spun Hollow Pole.
- (k) Procurement of 12,549 Nos. 11 kV D-Fuse Fittings.
- (l) Approval for signing of Back-to-Back Agreement between CPPA-G and GEPCO simultaneously to signing EPA between CPPA-G and M/s Shahtaj Sugar Mills Limited.
- (m) Procurement of 1,000 Nos. HT Steel Structures 45 ft.

8.5.4 <u>Attendance of Members during BODs Meetings of Faisalabad Electric Supply Company</u> <u>Limited (FESCO):</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Khurram Mukhtar	Chairman BOD	11	01
2	Mr. Mujahid Islam Billah	CEO/Director	12	00
3	Mr. Ihsaan Afzal Khan	Director	12	00
4	Chaudhry Javed Kamal	Director	- 05	00
5	Mian Zahid Aslam	Director	01	04
6	Syed Zia Alamdar Hussain	Director	05	00

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S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
7	Mr. Abdul Hameed Chaudhry	Director	12	00
8	Mr. Faiq Jawad	Director	02	03
9	Mr. Noor Ahmed	Director	00	06
10	Khawaja Shahid Razak Sikka	Director	00	06
11	Mr. Khurram Tariq	Director	04	03
12	Syed Aly Murtazza	Director	07	00
13	Mr. Shaheryar Chishty	Director	02	05
14	Mr. Akhlaq Ahmad Syed	Director	06	01
15	Sardar Ahmad Ayaz Sadiq	Director	01	01
16	Mr. Saadullah Khan	Director	04	03
17	Mr. Momin Agha	Director	03	02
18	Mr. Javed Iqbal Khan	Director	05	01
19	Lt. Col. (R) Syed Saleem Ahmad	Director	03	02
20	Mr. Asif Iqbal	Director	01	00

8.5.4.1 Main Agenda Items of BODs Meetings of FESCO:

- (a) Purchase of 12 MW Power from AJ Power Solar Plant Adhi Kot, District Khushab.
- (b) Approval for Procurement of 17,100 HT PC and 17,850 LT PC Spun Hollow Poles.
- (c) Approval for Procurement of 2,908 km ACSR Rabbit, 5,803 km AAC Ant, ACSR LYNX, ACSR Rail Conductor.
- (d) Approval for Procurement of 2,450 km SID Cable 2/Core 10mm².
- (e) Approval for Procurement of 600 Nos. 15 kVA, 673 Nos. 25 kVA, 1,750 Nos. 50 kVA, 1000 Nos. 100 kVA, 800 Nos. 200 kVA and 80 Nos. 630 kVA Distribution Transformers.
- (f) Approval for Procurement of 33,350 Nos. 11 kV Angle Iron Cross Arms.
- (g) Approval of Procurement plan for Transformer Reclamation Workshop Material.
- (h) Approval for Procurement of 290,058 Single Phase Static Meters.
- (i) Approval for Procurement of 132 kV GIS Equipment for 132 kV GIS City G/S Faisalabad.
- (j) Approval for Procurement of 09 MW and 08 MW Bagasse Based Power from M/s Al-Arabia Sugar Mills Limited and M/s Jahuarabad Sugar Mills respectively.
- (k) Approval for Procurement of 132 kV ZM-1 Type Towers.

8.5.5 <u>Attendance of Members during BODs Meetings of Multan Electric Power Company</u> <u>Limited (MEPCO):</u>

<u></u>				
S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Khalid Masood Khan	Ex-Chairman BOD	14	00
2	Mr. Akhlaq Ahmed Syed	Chairman BOD	07	07
3	Engr. Masood Salahuddin	Ex-CEO/Director	02	12
4	Engr. Muhammad Akram Ch.	CEO/Director	11	03
5	Mr. Sadullah Khan	Director	07	07
6	Mr. Shehryar Arshad Chishti	Director	05	09
7	Mr. Asrar Ahmed Malik	Director	07	07
8	Mr. Zafar Abbas	Director	09	05
9	Mr. Muhammad Anwar Sheikh	Director	07	07
10	Mr. Bilal Ahmed Butt	Director	07	07
11	Khawaja Mohammad Azam	Director	07	07
12	Mian Zahid Pervaiz Marral	Director	07	07
13	Mr. Asad Rehman Gillani	Director	02	12
14	Mian Shahid Igbal	Director	07	07

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8.5.5.1 Main Agenda Items of BODs Meetings of MEPCO:

- (a) Approval for Procurement of 2,150 Nos. 25 kVA Distribution Transformers.
- (b) Approval for Procurement of 4,500 km ACSR Rabbit Conductor.
- (c) Approval for Procurement of 8,900 km ACSR Osprey Conductor.
- (d) Approval for the Proposal for bifurcation/rehabilitation of 11 kV:
 - (i) Baghdad and Tiba Badar Feeder both emanating from 132 kV G/S Baghdad-ul-Jadid
 - (ii) Baseera Feeder both emanating from 132 kV G/S Qasba Gujrat
 - (iii) Khan Pur Feeder both emanating from 132 kV G/S A.P. East
 - (iv) Kotla Musa Khan and Hateji Feeder both emanating from 132 kV G/S A.P. East
 - (v) Ismail Pur Feeder emanating from 132 kV G/S Uch Sharif
 - (vi) Peer Sadiq Shah Feeder both emanating from 132 kV G/S Makhdoom Rasheed
 - (vii) City Kot Mithan Feeder both emanating from 132 kV G/S Rajanpur
 - (viii) Chak Ratta Tiba Feeder both emanating from 132 kV G/S Ludden
 - (ix) Old and New Kassowal Feeders both emanating from 132 kV G/S Mian Channu
 - (x) Scrap-09 Feeder both emanating from 132 kV G/S R.Y. Khan-II
 - (xi) Tatay Pur Feeder both emanating from 132 kV G/S Vehari Road
 - (xii) Benazir and Salsadar Feeders both emanating from 132 kV G/S Lodhran
- (e) Approval for the Procurement of G/S and T/Line material for FY 2017-18 required by GSC and GSO formations.
- (f) Approval for Procurement of Plant Design, Supply and Installation, Testing and Commissioning of conversion of 66 kV G/S to 132 kV level on Turnkey basis.
- (g) Approval for Construction of new 132 kV G/S along with its feeding T/Line at Bahawalnagar-II.
- (h) Approval for Agreement for Operation and Maintenance of 132 kV G/S and 11 kV Feeders, Mineral Exploration Project (MEP) D.G. Khan.
- (i) Approval for Recognition of Meritorious Services Regarding Preparation/Finalization of Tariff Petition of MEPCO for FY 2016-17 and FY 2017-18.
- (j) Approval for Procurement of 3000 km PVC 2/Core 10mm².
- (k) Approval for Procurement of 184 km ACSR Rail Conductor.
- (l) Approval for connectivity/bifurcation proposal for shifting of load of 11 kV High Court Feeder both emanating from 132 kV G/S MEPCO to 132 kV G/S Suraj Miani.
- (m) Approval for Construction of 7 km New 11 kV Independent D/C Feeder with Osprey Conductor for new connection of Tayyip Erdogan Hospital Trust & College Muzaffargarh.

8.5.6 <u>Attendance of Members during BODs Meetings of Hyderabad Electric Supply Company</u> <u>Limited (HESCO):</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Prof. Dr. Muhammad Aslam Uqaili	Chairman BOD	13	00
2	Mr. Raham Ali Otho	CEO/Director	13	00
3	Mr. Mahfooz Ahmed Bhatti	Director	07	00
4	Mr. Saeed Ahmed Mangnejo	Director	13	00
5	Mr. Mehmood Nawaz Shah	Director	13	00
6	Mr. Waqas Anwar Qureshi	Director	13	00
7	Mr. Tassaduq Hussain	Director	13	00
8	Mr. Shafique Ahmed Mahesar	Director	10	03
9	Col. (R) Syed Saleem Ahmed	Director	04	01

8.5.6.1 Main Agenda Items of BODs Meetings of HESCO:

- (a) Approval of 11 kV Independent feeder from 132 kV G/Ss (Nawabshah Site, Nawabshah Site-III, and Shahdad Pur) and from 66 kV G/S (Islamkot).
- (b) Approval of electrification overhead system of different Housing Schemes.

- (c) Approval of supply of power of 08 MW load in favor of kV HVDC Converter Station Matiari (CPEC Project) under Bulk Power Supply Tariff C-3.
- (d) Procurement of 03 Nos. 132/11 kV, 03 Nos. 132/11.5 kV, 05 Nos. 31.5/40 MVA and 01 Nos. 20/26 MVA Power Transformers.
- (e) Approval for Procurement of 25 kVA Distribution Transformers.
- (f) Approval for Procurement of 100,000 Static Single Phase Energy Meters.
- (g) Approval for Procurement of HT Steel Structures (34ft 8in).
- (h) Approval for Supply of Power of 30 MW load in favor of M/s METCO Steel (Pvt.) Limited.

8.5.7 <u>Attendance of Members during BODs Meetings of Sukkur Electric Power Company</u> <u>Limited (SEPCO):</u>

S. No.	Name of Board Director	Designation	Meeting Attended	Leave of Absence
1	Mr. Nisar Ahmed Siddiqui	Chairman BOD	05	01
2	Mr. Abdul Latif Anjum	Ex-CEO/Director	04	00
3	Syed Ahmed Dawach	CEO/Director	02	00
4	Mr. Wazir Ali Bhayo	Director	05	01
5	Syed Muharram Ali Shah	Director	03	03
6	Dr. Murad Ali Khamisani	Director	06	00
7	Mr. Santosh Kumar Pinjani	Director	06	00
8	Mr. Abdul Aziz Shevani	Director	05	00
9	Mr. Muhammd Abbas Baloch	Director	04	02
10	Mr. Muhammad Usman Chachar	Director	02	00

8.5.7.1 Main Agenda Items of BODs Meetings of SEPCO:

- (a) Procurement of 132 kV Circuit Breakers with SSS, 170,000 Single Phase Energy Meters, 11 kV Outgoing Panels.
- (b) Provision of Dedicated 11 kV Feeder to 04 connections of Urban Drainage Schemes.
- (c) Procurement of 2,500 Nos. HT Spun Poles (36ft).
- (d) Discussion on Current T&D Losses, Accuracy of Mobile Meter Reading, Detection Billing, Status of Recovery Position with Assessment, System Constraints, etc.
- (e) SOP for Processing Distributed Generation and Net Metering Cases as per Policy Framework approved by NEPRA.

8.5.8.1 Main Agenda Items of BODs Meetings of QESCO:

- (a) Procurement of 50 Nos. 145 kV Circuit Breakers.
- (b) Procurement of 20,200 HT PCC Spun Hollow Poles.
- (c) Procurement of 3,000 km Dog, 7,000 km Rabbit ACSR and 8,000 km AAC Ant Conductor.
- (d) Procurement of 2,000 km PVC 2-Core 10mm and 80,000 Single Phase Static Meters.
- (e) Construction of 132 kV Double Circuit Transmission Line from Khuzdar to Mastung (209 km) and from Loralai to Quetta (267 km) along with line bays.
- (f) Procurement of HT Steel Structure (40ft) and HT Steel Structure (45ft).
- (g) Approval of acceptance of Bid Cost for construction of 132 kV (AIS) Grid Station CHB, Indoor switchyard, Transformer way, Equipment Foundation etc. at Deep Sea Port, Gwadar and Jiwini.
- (h) Approval for creation of new Huramzai Sub-Division.
- (i) Approval of tender for village electrification and maintenance works in Kohlu, Barkhan and Baker.

8.6 KEL'S BOARD OF DIRECTORS (BODS) MEETINGS

KEL did not provide the relevant information.

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ENERGY SECTOR OVERVIEW

9.1 GENERAL

Primary commercial energy supplies in Pakistan comprises of oil, natural gas, coal, hydro and nuclear electricity. The primary energy supplies of the country during FY 2017-18 increased by 8.44% and reached 86.30 MTOE as compared to 79.58 MTOE during the same period last year. The overall contribution of gas in primary energy supplies of the country, during 2017-18, was the highest with 29.85 MTOE (34.59%) followed by the Oil 26.90 MTOE (31.17%), Hydro Electricity 6.67 MTOE (7.72%), Coal 10.93 MTOE (12.66%), Nuclear Electricity 2.36 MTOE (2.73%), LPG 1.05 MTOE (1.22%), Imported Electricity 0.13 MTOE (0.15%), LNG Imported 7.49 MTOE (8.68%) and Renewable Energy 0.92 MTOE (1.07%).

9.2 OIL RESERVES

The balance recoverable reserves of crude oil of the country as on 30th June, 2018 were 347.878 million barrels while the production during FY 2017-18 was recorded as 32.56 million barrels. The total oil refining capacity of the country as on 30th June, 2018 was 19.37 million tonnes per year while the total crude oil processed in the refineries of the country was 14.01 million tonnes. The total import of the crude oil of the country during 2017-18 was 10.33 million tonnes with cost amounting to US\$ 4,903.65 million while during 2016-17 the total import of crude oil was 8.66 million tonnes with total cost of US\$ 2,899.29 million. The consumption of petroleum products (Furnace Oil, Light Diesel Oil, High Speed Diesel and Motor Spirit) within the power sector was recorded as 6.377 million tonnes during 2017-18 while during 2016-17 it was recorded as 8.532 million tonnes.

9.3 GAS RESERVES

The balance recoverable reserves of natural gas of the country as on 30th June, 2018 were 19.54 trillion cft. while the production during FY 2017-18 was recorded as 1,458,936 million cft. The consumption of natural gas in power sector during 2017-18 was recorded as 544,654 million cft. while during 2016-17 it was recorded as 446,941 million cft. The total network for distribution of natural gas in Pakistan as on 30th June, 2018 was 184,681 km. The total number of natural gas consumers in Pakistan, as on 30th June, 2018 was 9,182,633 of which the share of domestic, commercial and industrial consumers were (9,091,803), (80,042) and (10,788), respectively.

9.4 COAL RESERVES

The estimated total coal reserves of the country as on 30th June, 2018 were about 186 billion tonnes while production of coal during 2017-18 was recorded as 4.30 million tonnes. The total coal imported during 2017-18 was 13.68 million tonnes, with cost amounting to Rs. 154,795 million. The total coal consumption in power sector during 2017-18 was 4,436,125 tonnes as compared to 859,600 tonnes, same period previous year. The electricity generated through coal during fiscal years 2016-17 and 2017-18 was 1,059 GWh and 12,225 GWh respectively.

9.5 PRIMARY ENERGY SUPPLIES

The main primary energy production of the country consists of oil, gas, coal, nuclear electricity net generation (converted to Btu using the nuclear plants heat rate); and conventional hydroelectricity net generation (converted to Btu using the fossil-fueled plants heat rate). The primary commercial energy supplies by source from 2013-14 to 2017-18 is given in table 1:
	Primary Energy Supplies by Source (MTOE)										
Source	Unit	2013-14	2014-15	2015-16	2016-17	2017-18					
O ;1 ¹	Million TOE	23.007	24.970	25.280	27.367	26.903					
Ou	% share	34.416	35.53 8	34.178	34.387	31.174					
6.54	Million TOE	30.965	29.978	30.461	30.163	29.849					
Gds	% share	46.321	42.665	41.181	37.901	34.587					
	Million TOE	0.364	0.457	0.909	1.009	1.054					
LFG	% share	0.544	0.651	1.229	1.267	1.221					
Cool	Million TOE	3.590	4.953	5.067	6.482	10.925					
Coal	% share	5.371	7.049	6.850	8.145	12.659					
Hydro Electricity ³	Million TOE	7.608	7.751	8.267	7.682	6.665					
	% share	11.381	11.031	11.176	9.652	7.723					
Nuclear	Million TOE	1.215	1.385	1.099	1.671	2.358					
Electricity ³	% share	1.818	1.972	1.486	2.099	2.733					
Renewable	Million TOE		0.191	0.370	0.637	0.921					
Electricity ⁴	% share		0.272	0.500	0.800	1.067					
ING Import ⁴	Million TOE		0.473	2.404	4.456	7.493					
	% share		0.672	3.250	5.599	8.682					
Imported	Million TOE	0.100	0.106	0.111	0.118	0.133					
Electricity ⁵	% share	0.149	0.150	0.149	0.149	0.154					
Total	Million TOE	66.848	70.264	73.967	79.584	86.301					
iotat	% share	100.000	100.000	100.000	100.000	100.000					
Annual Growt	h Rate (%)	3.499	5.109	5.270	7.595	8.440					

TABLE 1

Excluding petroleum products exports and bunkering.

Include imports and production from field plants.

³ Converted @ 10,000 Btu/kWh to represent primary energy equivalent of hydro and nuclear electricity as if this was generated by using fossil fuels.

⁴ LNG Imports and Renewable Generation reported for the first time in FY 2014-15.

⁵ WAPDA importing electricity from Iran since October, 2002.

Source: Pakistan Energy Yearbook, HDIP, Islamabad



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FINAL ENERGY CONSUMPTION 9.6

Final energy is a form of energy available to the user following the conversion from primary energy. Gasoline or diesel oil, purified coal, purified natural gas, electricity, mechanical energy are different forms of final energy. When going from primary energy to final energy, there is always loss of some energy which depends on the efficiency of the conversion device. The final energy consumption by source from 2013-14 to 2017-18 is given in table 2:

Final Energy Consumption by Source (MTOE)										
Source	Unit	2013-14	2014-15	2015-16	2016-17	2017-18				
O ;1 ¹	Million TOE	12.718	13.85 1	16.290	17.905	19.265				
Ou	% share	31.939	32.992	35.893	35.723	35.032				
Gas ²	Million TOE	16.277	15.756	15.544	17.031	16.694				
	% share	40.877	37.528	34.250	33.979	30.356				
LPG	Million TOE	0.586	0.756	1.210	1.308	1.385				
	% share	1.471	1.802	2.667	2.611	2.519				
Coal ²	Million TOE	3.446	4.632	4.975	6.098	8.940				
Coat	% share	8.654	11.032	10.963	12.166	16.258				
Electricity ³	Million TOE	6.793	6.989	7.365	7.780	8.708				
Electricity	% share	17.059	16.647	16.227	15.522	15.835				
Total	Million TOE	39.820	41.984	45.385	50.122	54.993				
Totat	% share	100.000	100.000	100.000	100.000	100.000				
Annual Grow	vth Rate (%)	-0.909	5.436	8.100	10.438	9.717				

TABLE 2

¹ Excluding consumption for power generation.

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² Excluding consumption for power generation and feedstock.

³ @ 3412 Btu/kWh being the actual energy content of electricity.

Source: Pakistan Energy Yearbook, HDIP, Islamabad



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9.7 FUEL CONSUMPTION IN POWER SECTOR

The share of installed capacity of thermal power plants using oil, natural gas and coal to the total installed capacity in the country, during 2017-18, was about 66.76% while the electricity produced by the thermal power plants, during 2016-17, to the total electricity generated in the country during same period was about 65.76%. The statistics of different fuel used and their percentage share to the total fuel used for thermal electricity generation of the country from 2013-14 to 2017-18 are given in table 3 as follows:

	TABLE 3										
Fuel Consumption for Thermal Power Generation (TOE)											
Source	Unit	2013-14	2014-15	2015-16	2016-17	2017-18					
Gar	TOE	6,602,422	6,847,894	8,577,146	8,643,403	10,831,662					
Gas	% share	42.69	43.57	52.78	49.80	56.89					
Eurnaca Oil	TOE	8,486,744	8,234,479	7,288,400	8,037,139	6,029,947					
Furnace Ou	% share	54.87	52.40	44.85	46.30	31.67					
Discol Oil	TOE	304,994	565,953	294,755	291,841	194,033					
Diesei Oli	% share	1.97	3.60	1.81	1.68	1.02					
Coal	TOE	71,902	67,638	91,463	384,585	1,984,722					
Coal	% share	0.46	0.43	0.56	2.22	10.42					
Total	TOE	15,466,062	15,715,964	16,251,764	17,356,968	19,040,364					
Totat	% share	100.00	100.00	100.00	100.00	100.00					
Annual Grow	rth Rate (%)	5.40	1.62	3.41	6.80	9.70					

Source: Pakistan Energy Yearbook, HDIP, Islamabad



ELECTRICITY SECTOR OVERVIEW

10.1 INSTALLED CAPACITY

The total nominal power generation capacity of Pakistan as on 30th June, 2018 was 35,979 MW; of which 24,020 MW (66.76%) was thermal, 8,713 MW (24.22%) was hydroelectric, 1,467 MW (4.08%) was nuclear and 1,779 MW (4.94%) was renewable energy (wind, solar and bagasse). The following tables (table 4 to 6) explain the total installed capacity of Pakistan from 2013-14 to 2017-18:

IABLE 4										
d Capacity by	Type (MW)									
2014	2015	2016	2017	2018						
6,902	6,902	6,902	6,902	8,341						
214	214	214	214	372						
7,116	7,116	7,116	7,116	8,713						
30.02	28.51	27.99	25.06	24.22						
4,590	5,762	5,897	5,897	5,637						
1,951	1,874	1,874	1,874	2,294						
8,700	8,696	8,643	10,566	15,297						
252	252	252	252	366						
-	-	-	-	340						
200	35	35	87	87						
15,693	16,619	16,701	18,676	24,020						
66.21	66.58	65.70	65.76	66.76						
650	650	615	1,005	1,330						
137	137	137	137	137						
787	787	752	1,142	1,467						
3.32	3.15	2.96	4.02	4.08						
SSE)										
106	439	852	1,465	1,779						
106	439	852	1,465	1,779						
0.45	1.76	3.35	5.16	4.94						
23,702	24,961	25,421	28,399	35,979						
	d Capacity by 2014 6,902 214 7,116 30.02 4,590 1,951 8,700 252 - 200 15,693 66.21 650 137 787 3.32 SSE) 106 0.45 23,702	Active Type (MW) 2014 2015 6,902 6,902 214 214 7,116 7,116 30.02 28.51 4,590 5,762 1,951 1,874 8,700 8,696 252 252 - - 2000 35 15,693 16,619 66.21 66.58 650 650 137 137 787 787 3.32 3.15 SSE) 106 439 0.45 1.76 23,702	Abble 4 d Capacity by Type (MW) 2014 2015 2016 6,902 6,902 6,902 214 214 214 7,116 7,116 7,116 30.02 28.51 27.99 4,590 5,762 5,897 1,951 1,874 1,874 8,700 8,696 8,643 252 252 252 - - - 200 35 35 15,693 16,619 16,701 66.21 66.58 65.70 650 650 615 137 137 137 787 787 752 3.32 3.15 2.96 SE) 106 439 852 0.45 1.76 3.35 23,702 24,961 25,421	Active of the second stress						

Source: WAPDA/GENCOs/KEL/IPPs/CPPA-G



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r	F tant-wise m	statted capacity (r	1vv) as 011	SU Julie													
Power Station	Plant Location	Type of Power Station	2014	2015	2016	2017	2018*										
		A1: Hvdel (WAPI	DA)	I		-											
Major Hydropower Un	its		,														
Tarbela	Tarbela, KPK	Reservoir	3,478	3,478	3,478	3,478	3,948										
Ghazi Barotha	Ghazi Barotha, Punjab	Run of River	1,450	1,450	1,450	1,450	1,450										
Mangla	Mangla, AJ&K	Reservoir	1,000	1,000	1,000	1,000	1,000										
Warsak	Warsak, KPK	Run of River	243	243	243	243	243										
Chashma	Chashma, Punjab	Run of River	184	184	184	184	184										
Khan Khwar	Shangla, KPK	Reservoir	72	72	72	72	72										
Allai Khwar	Battagram, KPK	Reservoir	121	121	121	121	121										
Jinnah Hydel	Mianwali, Punjab	Run of River	96	96	96	96	96										
Duber Khwar	Kohistan, KPK	Reservoir	130	130	130	130	130										
Neelum Jhelum	M/abad, AJ&K	Run of River	-	-	-	-	969										
Small Hydropower Un	its		11														
Dargai	Dargai, KPK	Run of Canal	20	20	20	20	20										
Rasul	Rasul Puniab	Run of Canal	22	22	22	22	22										
Shadiwal	Shadiwal Puniab	Run of Canal	14	14	14	14	14										
Chichoki Mallian	Chichoki M. Puniab	Run of Canal	13	13	13	13	13										
Nandipur	Nandipur Puniab	Run of Canal	14	14	14	13	14										
Kurram Garhi	Kurram Garhi KPK	Run of Canal	4	4	4	4	4										
Renala	Renala Puniab	Run of Canal	1	1	1	1	1										
Chitral	Chitral KPK	Run of Canal	1	1	1	1	1										
Gomal Zam	S/Waziristan Agency, KPK	Reservoir	17	17	17	17	17										
Malakand/Jabban	Malakand KPK	Run of River	22	22	22	22	22										
Others						-											
T		6,902	6,902	6.902	6.902	8.341											
	, , ,	A2: Hydel (IPP	s)	-1	-,	-1	-1										
lagran (AI&K)	Jagran AJ&K	Hydro	30	30	30	30	30										
Malakand-III (PEDO)	Malakand KPK	Run of River	81	81	81	81	84										
Pehur (PEDO)	Swabi KPK	Run of River	18	18	18	18	18										
Laraib Energy (AI&K)	Ihelum River AI&K	Hydro	84	84	84	84	84										
Garam Chashma	Chitral KPK	Hydro	1	1	1	1	1										
Marala Hydro (PPDCI)	Sialkot Puniah	Run of River	-	-	-	-	8										
Patrind Hydro (AI&K)	M/abad AI&K	Run of River	-	-	-	-	147										
Tuttina Hydro (70art)		Run of Revel	214	214	214	214	372										
	Total Hydel (A1+A2)		7 116	7 116	7 116	7 116	8 713										
	B1: The	ermal (GENCOs in Pl	EPCO syster	n)	.,	.,	0,1.10										
TPS Jamshoro	Jamshoro, Sindh	STs	850	880	880	880	880										
GTPS Kotri	Kotri, Sindh	GTs+CCPP	174	144	144	144	144										
TPS Guddu (Units 1-4)	Guddu, Sindh	STs	640	640	640	640	640										
TPS Guddu (Units 5-13)	Guddu, Sindh	GTs+CCPPs	1,015	1,015	1,015	1,015	1,015										
TPS Guddu (Units 14-16)	Guddu, Sindh	GTs+ST+CCPPs	-	747	747	747	747										
TPS Quetta	Quetta, Balochistan	GT	35	35	28	28	0										
TPS Muzaffargarh	M/garh, Punjab	STs	1,350	1,350	1,350	1,350	1,350										
SPS Faisalabad	Faisalabad, Punjab	STs	132	132	132	132	0**										
GTPS Faisalabad	Faisalabad, Punjab	GTs+CCPPs	244	244	244	244	144**										
TPS Nandipur	Gujranwala, Punjab	GTs+CCPPs	-	425	567	567	567										
FBC Lakhra	Lakhra, Sindh	STs	150	150	150	150	150										
Total Therr	nal (GENCOs in PEPCO	system)	4.590	5.762	5.897	5.897	5 637										

TABLE 5 Plant-wise Installed Capacity (MW) as on 30th June

 \mathbb{N}

Power Station	Plant Location	Type of Power Station	2014	2015	2016	2017	2018*
	B2: Therma	l (IPPs connected wi	th PEPCO s	ystem)			
Lal Pir Power	Mehmood Kot, Punjab	ST	362	362	362	362	362
Pak Gen. Power	Mehmood Kot, Punjab	ST	365	365	365	365	365
Altern Energy	Fateh Jang, Punjab	GEs	31	31	31	31	31
Fauji Kabirwala	Kabirwala, Punjab	GTs+CCPP	157	157	157	157	170
Habibullah Coastal	Quetta, Balochistan	GTs+CCPP	140	140	140	140	155
Hub Power	Hub, Balochistan	STs	1,292	1,292	1,292	1,292	1,292
Japan Power	Raiwind, Punjab	DE	135	135	135	135	120
КАРСО	Kot Addu, Punjab	GTs+CCPPs	1,638	1,638	1,600	1,600	1,600
Kohinoor Energy	Raiwind, Punjab	DEs+ST	131	131	131	131	131
Rousch Power	Sidhnai, Punjab	GTs+ST	450	450	450	450	450
Saba Power	Farooqabad, Punjab	ST	134	134	134	134	136
Southern Electric	Raiwind, Punjab	DEs	136	136	136	136	117
TNB Liberty Power	Daharki, Sindh	GTs+CCPP	235	235	235	235	235
Uch Power	Murad J., Balochistan	GTs+ST	586	586	586	586	586
Attock Gen.	Attock Morgah, Punjab	DGs+ST	165	165	165	165	165
Atlas Power	S/pura, Punjab	REs+ST	219	219	219	219	224
Engro Power Gen. Qadirpur	Qadirpur, Sindh	GT+ST	217	217	217	217	227
Saif Power	Sahiwal, Punjab	GTs+ST	225	225	210	210	225
Orient Power	Balloki, Punjab	GTs+ST	225	225	225	225	225
Nishat Power	Qasur, Punjab	REs+ST	202	200	200	200	202
Nishat Chunian	Qasur, Punjab	DEs+ST	202	200	200	200	202
Sapphire Electric	Muridke, Punjab	GTs+ST	235	235	235	235	235
Halmore Power	Bhikki, Punjab	GTs+ST	225	225	225	225	225
Narowal Energy	Narowal, Punjab	DEs+ST	214	214	214	214	214
Liberty Power Tech.	Faisalabad, Punjab	DEs+ST	202	202	202	202	202
Foundation Power	Daharki, Sindh	GT+ST	185	185	185	185	179
Davis Energen.	Jhang, Punjab	GEs	11	11	11	14	12
Uch-II Power	Murad J., Balochistan	GTs+ST	381	381	381	381	404
Huaneng Shandong Ruyi (Sahiwal Imported Coal)	Sahiwal, Punjab	STs	-	-	-	660	1,320
QATPL (Bhikki)	Bhikki, Punjab	GTs+HRSGs+ST	-	-	-	832	1,231
NPPMCL (Haveli Bahadur Shah)	HBS, Punjab	GTs+HRSGs+ST	-	-	-	428	1,277
NPPMCL (Balloki)	Balloki, Punjab	GTs+HRSGs+ST	-	-	-	-	1,276
Port Qasim Electric	Port Oasim Sindh	ST+CB	-	-	-	-	1 320
Power		51105					1,520
Reshma Power	Raiwind, Punjab	Reciprocating Engine	-	-	-	-	97
Gulf Powergen	Gujranwala, Punjab	Reciprocating Engine	- 0 700	-	-	-	84
Total Thermal (I	PPs connected with PE	PCO system)	8,700	8,696	8,643	10,566	15,297
Total Ther	mai in PEPCO system ((KE)	13,290	14,458	14,540	10,403	20,934
	Kanaah: Cinalh	CI: Inermal (KEL C	Jwn)	0.40	0.40	040	1 2 C 0 [‡]
Bin Qasim TPS-I	Karachi, Sindh		840 572	840 570	840 570	840 570	1,260
	Karachi, Sindh	GIS	572	572	572	572	572
Korangi TPS	Karachi, Sindh	SIS	125	-	-	-	-
Korangi Town GTPS-II	Karachi, Sindh	GIS	97	107	107	107	107
Site GTPS-II	Karachi, Sindh	GIS	97	107	107	107	107
	Karachi, Sindh	GIS	220	248	248	248	248
10	tal Thermal (KEL Own)		1,951	1,874	1,874	1,8/4	2,294
Cul Abread	C2: Th			L) 100	120	120	120
Gul Anmed	Karachi, Sindh	DE+SI	128	128	128	128	136
Tapat Energy	Karachi, Sindh	DE+SI	124	124	124	124	126
SNPCL	Jamsnoro, Sindh	GES+SIS	-		-	-	104
lotal Ther	mai (IPPs connected wi	tn KEL)	252	252	252	252	366

Power Station	Plant Location	Type of Power Station	2014	2015	2016	2017	2018*				
	C3: The	rmal (Others connec	ted with K	EL)							
PASMIC	Karachi, Sindh	STs	165	-	-	-	-				
Anoud Power	Karachi, Sindh	DGs	12	12	12	12	12				
Intl. Steel Limited	Karachi, Sindh	GEs+DGs	19	19	19	19	19				
Intl. Ind. Limited	Karachi, Sindh	GEs+ST	4	4	4	4	4				
FFBL Power	Karachi, Sindh	CFB+STs	-	-	-	52	52				
Total Therm	al (Others connected v	vith KEL)	200	35	35	87	87				
Total	Thermal KEL (C1+C2+)	C3)	2,403	2,161	2,161	2,213	2,747				
		D: Nuclear				207	2.0-				
CHASNUPP-I	Chashma, Punjab	STs	325	325	300	325	325				
CHASNUPP-II	Chashma, Punjab	SIS	325	325	315	340	325				
CHASNUPP-III	Chashma, Punjab	SIs	-	-	-	340	340				
CHASNUPP-IV	Chashma, Punjab	SIs	-	-	-	-	340				
KANUPP	Karachi, Sindh	SIS	137	137	137	137	137				
	Total Nuclear (D)	Frank (an and all	18/	187	752	1,142	1,467				
E: Renewable Energy (connected with PEPCO system)											
Zarlu Enarii Dakistan	Thatta Sindh		Jects	EG	EG	E G	E G				
EEC Energy	Thatta, Stridh	WTS	50	50	50	50	50				
Three Gorges First Wind		VV15	50	50	50	50	50				
Farm	Thatta, Sindh	WIS	-	50	50	50	60				
Foundation Wind Energy-I	Thatta, Sindh	WTs	-	50	50	50	50				
Foundation Wind Energy-II	Thatta, Sindh	WTs	-	50	50	50	50				
Sapphire Wind	Thatta, Sindh	WTs	-	-	50	50	53				
Yunus Energy	Thatta, Sindh	WTs	-	-	-	50	50				
Metro Power Company	Thatta, Sindh	WTs	-	-	-	50	50				
Gul Ahmad Wind	Thatta, Sindh	WTs	-	-	-	50	50				
Master Wind Energy	Thatta, Sindh	WIs	-	-	-	50	50				
Tenaga Generasi	Thatta, Sindh	WIS	-	-	-	50	50				
HydroChina Dawood Power	Thatta, Sindh	WIS WT-	-	-	-	50	50				
Sachal Energy Development	Thatta, Sindh	VV I S	-	-	-	50	50				
OEP Wind Power	Thatta, Sindh	VV I S	-	-	-	99	99				
Artistic Wind Power	Thatta, Sindh	VV IS	-	-	-	30	50				
Tapat Wind Energy	Thatta, Stridh	VVIS	-	-	-	-	50				
Hawa Energy	Thatta, Stridh	VVIS W/Tc	-	-	-	-	50				
Three Gorges Second Wind		VV15	-	-	-	-	50				
Farm	Thatta, Sindh	WTs	-	-	-	-	50				
Three Gorges Third Wind Farm	Thatta, Sindh	WTs	-	-	-	-	50				
Tot	al Wind Power Project	5	106	256	306	785	1,048				
		E2: Solar Power Pro	ojects								
Quaid-e-Azam Solar Park	Bahawalpur, Punjab	Solar	-	100	100	100	100				
Appolo Solar	Bahawalpur, Punjab	Solar	-	-	100	100	100				
Best Green Solar	Bahawalpur, Punjab	Solar	-	-	100	100	100				
Crest Solar	Bahawalpur, Punjab	Solar	-	-	100	100	100				
AJ Power	Khushab, Punjab	Solar	-	-	-	-	12				
Harappa Solar	Sahiwal, Punjab	Solar	-	-	-	-	18				
Tot	al Solar Power Projects	5	0	100	400	400	430				
	E3: B	agasse/Biomass Pow	er Projects	;		di la					
Jamal Din Wali-II	RYK, Punjab	Bagasse+Biomass	-	26	26	26	26				
Jamal Din Wali-III	RYK, Punjab	Bagasse+Biomass	-	27	27	27	27				
RYK Mills	RYK, Punjab	Bagasse	-	30	30	30	30				
Chiniot Power	Chiniot, Punjab	Bagasse	-	-	63	63	63				

Estima Energy	M/aarb	Duniah	D	iomass/Coal				110	120
Hamza Sugar Mills		runjab Jiah	Bac		-	-		119	120
The Thal Industries			Dag	5 DIOITIASS				15	15
Corporation	Layyah, F	Punjab		Bagasse	-	-	-	-	20
Total Ba	gasse/Bion	nass Power Pr	oject	ts	0	83	146	280	301
Total Renewable Energ	y (E1+E2+E3)	(connected wit	h PEP	CO system) (F)	106	439	852	1,465	1,779
		F: SPPs/CPPs/	/N-C	PPs connected v	with PEPCO) System			
		DISCO		Type		Fuel		Contract C	ap. (MW) [#]
		Disco		Type		Tuct		2017	2018
Sitara Energy		FESCO		SPP		RFO		25	25
Galaxy Textile		FESCO		N-CPP		Gas		11.6	11.6
Shakarganj Energy		FESCO		CPP	Bagasse			6	6
Shakarganj Sugar Mills	5	FESCO		СРР		Bagasse		2	2
Ramzan Sugar Mills		FESCO		CPP		Bagasse		12	12
Noon Sugar Mills		FESCO		СРР		Bagasse		14.8	12
Bhone Sugar Mills		FESCO		СРР		Bagasse		1	1
Indus Sugar Mills		MEPCO		СРР		Bagasse		4	4
Ashraf Sugar Mills		MEPCO		СРР		Bagasse		3	3
Jamal Din Wali Sugar I	Mills	MEPCO		СРР		Bagasse		10	10
Hamzah Sugar Mills		MEPCO		СРР		Bagasse		2.5	2.5
Roomi Fabrics		MEPCO		СРР		Gas		5	5
Roomi Fabrics		MEPCO		N-CPP		Gas		10.5	10.5
Rahimyar Khan Sugar	Mills	MEPCO		СРР		Bagasse		8.5	8.5
Thal Industries		MEPCO		СРР		Bagasse		4	4
Thatta Power		HESCO		N-CPP		Gas		18.8	18.8
Anoud Textile		HESCO		N-CPP	Gas		10	10	
Agar Textile Mills		HESCO		СРР	Gas		2	2	
Faran Sugar Mills		HESCO		СРР	Bagasse		5	5	
Omni Power		HESCO		N-CPP		Gas		12.8	10
Omni-1		HESCO		N-CPP		Gas		-	10
Omni-2		HESCO		N-CPP		Gas		-	10
Chamber Sugar Mills		HESCO		СРР		Bagasse		1.5	1.5
Sanghar Sugar Mills		HESCO		СРР		Bagasse		13.5	3.4
Bandhi Sugar Mills		HESCO		СРР		Bagasse		10	10
Salim Yarn Mills		HESCO		СРР		Gas		2	2
Mekotex		HESCO		СРР		Gas		4	4
Hi-Tech Pipe & Engine	eering	HESCO		СРР		Gas		8	8
Mehran Sugar Mills		HESCO		СРР		Bagasse		2	2
TAY Sugar Mills		HESCO				Bagasse		9	9
Lucky Cement		HESCO		N-CPP		Gas		20	20
Al Noor Sugar Mills		SEPCO		СРР		Bagasse		8	8
Dharaki Sugar Mills		SEPCO		СРР		Bagasse		4	4
Ghotki Sugar Mills		SEPCO		CPP	Bagasse		8	8	
Dadu Energy		SEPCO		N-CPP	Gas		19.2	19.2	
Naudero Energy		SEPCO		N-CPP	Gas		15.8	15.8	
Lodra Power		SEPCO		N-CPP	Gas		16	16	
Brotners Sugar Mills		LESCO			Bagasse		3	3	
Layyan Sugar Mills		-			-		-	4	
Kumnar wala Powerho	buse-I	-			-		-	105	
Kumnar wala Powerho	ouse-II	-				- De		-	10.5
		HESCO			Constant of	Bagasse		-	3.4
101	at SPPS/CP	TS/IN-CPPS CO	nneo		System (24.004	25 424	512.5	339.7
Gra	nd Total (A	+R+C+D+E+I	F)		23,702	24,961	25,421	28,399	35,979

* Installed Capacity as per valid Generation Licence. ** Licence not available, partial energy procured during July, 2017 to February, 2018. * As per latest modification of KEL Licence, Unit 3&4 are now part of KEL's generation fleet. ** Contract Capacity as per Tariff Determination. Source: WAPDA/GENCOs/KEL/IPPs/CPPA-G

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TABLE 6 Installed Capacity by Systems and by Sectors (MW)

instated capact	cy by bysterns	and by Seele	//////////////////////////////////////		
As on 30 th June	2014	2015	2016	2017	2018
BY SYSTEM					
Total Installed Capacity in PEPCO System	21,299	22,800	23,260	26,186	33,232
% Share (Installed Capacity in PEPCO System)	89.86	91.34	91.50	92.21	92.36
Total Installed Capacity in KEL System	2,403	2,161	2,161	2,213	2,747
% Share (Installed Capacity in KEL System)	10.14	8.66	8.50	7.79	7.64
BY SECTOR					
Total Installed Capacity in Public Sector	12,279	13,451	13,551	13,941	15,445
% Share (Installed Capacity in Public Sector)	51.81	53.89	53.31	49.09	42.93
Total Installed Capacity in Private Sector	11,423	11,510	11,870	14,458	20,534
% Share (Installed Capacity in Private Sector)	48.19	46.11	46.69	50.91	57.07
Total Installed Capacity in the Country	23,702	24,961	25,421	28,399	35,979
Nata: Saa tablas 1 and 5 for braakup datails					

Note: See tables 4 and 5 for breakup details. Source: WAPDA/GENCOs/KEL/IPPs/CPPA-G





10.2 ELECTRICITY GENERATION

The total electricity generation of Pakistan as on 30th June, 2018 was 133,669 GWh; of which 92,086 GWh (68.89%) was thermal, 28,069 GWh (21.00%) was hydroelectric, 9,051 GWh (6.77%) was nuclear, 3,907 GWh (2.92%) was renewable energy (wind, solar and bagasse) and 555 GWh (0.42) was import from Iran. The following tables (table 7 to 11) explain the total electricity generation of Pakistan from 2013-14 to 2017-18:

	Electric	ity Generation	n by Type (Gi	/vn)		
As on 30 th J	une	2013-14	2014-15	2015-16	2016-17	2017-18
HYDEL						
WAPDA Hyd	el	31,203.64	31,525.00	33,433.33	31,091.29	26,951.19
IPPs Hydel		1,035.00	1,069.00	1,121.00	988.00	1,118.24
Sub-Total		32,238.64	32,594.00	34,554.33	32,079.29	28,069.43
% Share (Hyd	del Electricity Generation)	30.50	29.93	30.29	26.59	21.00
THERMAL						
GENCOs with	ו PEPCO	13,016.64	13,300.55	16,391.91	18,709.99	16,199.10
KEL Own		8,709.00	9,319.00	10,323.00	10,147.00	10,338.00
IDDc	Connected with PEPCO	43,692.67	44,369.02	45,146.42	47,972.10	62,433.73
IFFS	Connected with KEL	1,380.00	1,525.00	1,421.00	1,531.00	1,900.09
SPPs/CPPs/N	I-CPPs connected with PEPCO	1,108.00	1,015.00	251.00	271.40	665.53
SPPs/CPPs/N-CPPs connected with KEL		168.00	191.00	139.00	187.00	550.00
Sub-Total		68,074.31	69,719.57	73,672.33	78,818.49	92,086.44
% Share (Thermal Electricity Generation)		64.40	64.01	64.57	65.34	68.89
NUCLEAR						
CHASNUPP (I, II, III and IV)	4,402.00	4,996.00	3,854.00	5,868.00	8,719.87
KANUPP		293.00	353.00	362.00	410.00	331.00
Sub-Total		4,695.00	5,349.00	4,216.00	6,278.00	9,050.87
% Share (Nu	clear Electricity Generation)	4.44	4.91	3.70	5.20	6.77
IMPORT						
Import from	Iran	419.00	443.00	463.00	496.00	554.74
Sub-Total		419.00	443.00	463.00	496.00	554.74
% Share (Imp	ported Electricity Generation)	0.40	0.41	0.41	0.41	0.42
RENEWABL	E ENERGY (WIND, SOLAR AND BAG	GASSE)			-	
RE Power Pla	ints connected with PEPCO	272.00	811.15	1,187.00	2,950.00	3,907.12
Sub-Total		272.00	811.15	1,187.00	2,950.00	3,907.12
% Share (RE	Electricity Generation)	0.26	0.74	1.04	2.45	2.92
Total Electri	city Generation of the Country	105,698.95	108,916.72	114,092.66	120,621.78	133,668.60

	TABLE 7			
Electricity	Generation by	y T	уре	(GWh)

Source: WAPDA/GENCOs/KEL/IPPs/CPPA-G



			lectricity de		****		
Power Station	Primary Fuel	Alternate Fuel	2013-14	2014-15	2015-16	2016-17	2017-18*
		Α	1: Hvdel (WA	PDA)			
Major Hydropower Units							
Tarbela	Hydel	Hydel	15,138.00	14,759.00	15,990.31	15,049.44	13,356.86
Ghazi Barotha	Hydel	Hydel	6,937.00	6,612.00	6,721.69	6,885.76	6,020.89
Mangla	Hydel	Hydel	5,725.00	6,310.00	6,864.40	5,347.57	4,141.86
Warsak	Hydel	Hydel	870.00	908.00	924.25	985.44	916.53
Chashma	Hydel	Hydel	1,024.00	980.00	897.05	890.33	756.00
Khan Khwar	Hydel	Hydel	257.00	249.00	37.64	199.06	170.90
Allai Khwar	Hydel	Hydel	470.00	461.00	568.42	396.66	275.89
Jinnah Hydel	Hydel	Hydel	291.00	185.00	296.32	292.69	230.25
Duber Khwar	Hydel	Hydel	-	610.00	643.07	589.47	514.83
Neelum Jhelum	Hydel	Hydel	-	-	-	-	174.08
Small Hydropower Units							
Dargai	Hydel	Hydel	89.00	106.00	114.58	104.80	95.72
Rasul	Hvdel	Hvdel	51.00	67.00	95.98	93.47	65.54
Shadiwal	Hvdel	Hvdel	30.00	25.00	25.55	31.05	25.93
Chichoki Mallian	Hvdel	Hvdel	36.00	32.00	34.16	34.23	31.43
Nandipur	Hydel	Hydel	41.00	33.00	40.75	43.15	45.73
Kurram Garhi	Hydel	Hydel	19.00	19.00	23.40	18.44	17.24
Renala	Hvdel	Hvdel	2.96	2.00	2.03	2.20	2.31
Chitral	Hvdel	Hvdel	3.68	4.00	3.60	4.20	3.45
Gomal Zam	Hvdel	Hvdel	26.00	43.00	11.86	6.17	0.36
Malakand/Jabban	Hvdel	Hvdel	73.00	120.00	138.27	117.16	105.39
Others	Hydel	Hydel	120.00	0.00	0.00	0.00	0.00
Total Hyde	(WAPDA)		31,203.64	31,525.00	33,433.33	31,091.29	26,951.19
	<u> </u>		A2: Hvdel (IP	Ps)	-		•
Jagran (AJ&K)	Hvdel	Hvdel	105.00	123.00	111.00	93.00	86.92
Malakand-III (PEDO)	Hydel	Hvdel	409.00	408.00	425.00	426.00	362.11
Pehur (PEDO)	Hydel	Hvdel	51.00	49.00	40.00	45.00	32.61
Laraib Energy (AJ&K)	Hydel	Hydel	470.00	489.00	545.00	424.00	389.66
Garam Chashma	Hydel	Hvdel	0.00	0.00	0.00	0.00	0.00
Marala Hydro (PPDCL)	Hydel	Hvdel	-	-	-	-	0.74
Patrind Hydro (AJ&K)	Hydel	Hvdel	_	-	-	_	246.20
Total Hvd	lel (IPPs)		1.035.00	1.069.00	1.121.00	988.00	1.118.24
Total Hyde	l (A1+A2)		32.238.64	32.594.00	34.554.33	32.079.29	28.069.43
	. ,	B1: Therma	l (GENCOs in I	PEPCO system)		•
TPS Jamshoro	RFO+Gas	RFO	2,997.00	2.655.11	3.246.46	3,253,56	1,792.06
GTPS Kotri	Gas	HSD	156.00	306.11	582.02	338.67	94.92
TPS Guddu (Units 1-4)	Gas	RFO	1.257.00	522.00	148.64	227.08	258.11
TPS Guddu (Units 5-13)	Gas	-	3,100,00	4,990.00	2.330.44	3.308.36	4.661.92
TPS Guddu (Units 14-16)	Gas	HSD	-	-	3.551.47	4,543,55	3.855.08
TPS Ouetta	Gas	-	87.19	98.03	111.29	53.32	0.00
TPS Muzaffargarh	Gas	RFO	5,142.45	4,306.05	4,644.65	5,160.13	3,040.37
SPS Faisalabad	Gas	RFO	45.00	47.10	85.84	107.68	6.26
GTPS Faisalabad	Gas	HSD	120.00	29.88	275.16	214.62	105.29
TPS Nandipur	Gas	HSD	-	244.00	1,267,78	1.379.05	2,381.70
FBC Lakhra	Coal	Coal	112.00	102.27	148.16	123.97	3.39
Total Thermal (GENC	Os in PEPCO	system)	13,016.64	13,300.55	16,391.91	18,709.99	16,199.10
		111 A 11 A					

TABLE 8 Plant-wise Electricity Generation (GWh)

 $\left[\frac{1}{\sqrt{2}} \right]$

Power Station	Primary Alternate Fuel Fuel		2013-14	2014-15	2015-16	2016-17	2017-18*
	B2:	: Thermal (IPI	Ps connected v	with PEPCO sy	stem)		
Lal Pir Power	RFO	-	2,081.00	1,663.00	1,946.10	1,601.09	1,089.06
Pak Gen. Power	RFO	-	2,031.00	1,222.00	878.13	1,727.18	1,237.28
Altern Energy	Gas	-	205.00	173.00	184.60	198.30	145.12
Fauji Kabirwala	Gas	HSD	1,191.00	991.00	1,138.06	1,122.84	1,017.26
Habibullah Coastal	Gas	HSD	670.00	719.00	563.03	785.90	880.33
Hub Power	RFO	-	7,086.00	6,809.00	7,546.99	6,793.11	5,196.60
КАРСО	Gas	RFO+HSD	6,479.00	6,933.00	6,757.00	7,524.00	7,436.76
Kohinoor Energy	RFO	-	890.00	877.00	877.41	816.83	645.40
Rousch Power	Gas	HSD	2,760.00	2,465.00	2,970.66	2,459.69	2,591.64
Saba Power	RFO	-	129.00	35.00	70.59	510.46	465.88
TNB Liberty Power	Gas	HSD	943.00	1,218.00	1,491.36	1,430.23	1,041.56
Uch Power	Gas	HSD	4,314.00	4,130.91	4,213.96	4,406.44	4,442.99
Attock Gen.	RFO	-	1,243.00	1,209.00	1,179.30	1,135.41	912.45
Atlas Power	RFO	-	1,519.00	1,462.00	1,320.46	1,336.90	1,246.45
Engro Powergen. Qadirpur	Gas	HSD	1,440.71	1,429.00	1,222.00	1,731.00	1,668.42
Saif Power	Gas	HSD	723.18	770.92	1,088.78	905.44	841.56
Orient Power	Gas	HSD	540.50	1,037.00	1,155.62	944.68	841.39
Nishat Power	RFO	-	1,464.00	1,410.00	1,272.16	1,239.76	1,171.19
Nishat Chunian	RFO	-	1,471.00	1,415.31	1,240.16	1,350.33	1,099.67
Sapphire Electric	Gas	HSD	760.79	943.00	1,056.42	989.71	814.96
Halmore Power	Gas	HSD	504.10	713.15	916.00	553.00	871.01
Narowal Energy	RFO	-	1,562.39	1,418.16	1,161.91	1,334.18	1,199.68
Liberty Power Tech.	RFO	-	1,520.00	1,514.57	1,277.44	1,369.33	1,175.61
Foundation Power	Gas	-	1,359.00	1,322.00	1,211.48	1,382.85	1,392.39
Davis Energen.	Gas	-	54.00	70.00	74.00	61.05	8.82
Uch-II Power	Low B	TU Gas	752.00	2,419.00	2,332.81	2,731.34	2,593.04
Huaneng Shandong Ruyi (Sahiwal Imported Coal)	Bitumin	ous Coal	0.00	0.00	0.00	873.17	8,461.59
QATPL (Bhikki)	RLNG	HSD	-	-	-	502.77	3,655.62
NPPMCL (Haveli Bahadur Shah)	RLNG	HSD	-	-	-	155.11	2,856.73
NPPMCL (Balloki)	RLNG	HSD	-	-	-	-	2,050.62
Port Qasim Electric Power	Bituminous Co	al HSD	-	-	-	-	3,319.02
Reshma Power	RFO/HSFO	-	-	-	-	-	60.86
Gulf Powergen	RFO/HSFO	-	-	-	-	-	2.78
Total TI	hermal		43 692 67	44 369.02	45 146 42	47 972 10	62 433 73
(IPPs/SPPs/CPPs connect	ted with PEP	CO system)					
Total Thermal in PEP	CO system (B1+B2)	56,709.31	57,669.57	61,538.33	66,682.09	78,632.82
		C1:	Thermal (KEL	. Own)	2.050.00	1 2 2 2 2 2 2	1705.00
Bin Qasim TPS-I	Dual	-	3,765.00	3,925.00	3,958.00	4,329.00	4,765.00
Bin Qasim TPS-II	Dual	-	3,639.00	3,907.00	4,119.00	3,921.00	3,751.00
Korangi Town GTPS-II	Gas	-	393.00	435.00	500.00	389.00	323.00
Site GTPS-II	Gas	-	113.00	160.00	382.00	384.00	498.00
Korangi CCPP	Gas	-	799.00	892.00	1,364.00	1,124.00	1,001.00
Total Therma	al (KEL Own)		8,709.00	9,319.00	10,323.00	10,147.00	10,338.00
		C2: Therma	al (IPPs conne	cted with KEL			
Gul Ahmed	RFO	-	582.00	/18.00	688.00	/88.00	/47.63
Tapal Energy	RFO	-	/98.00	807.00	/33.00	/43.00	/65.46
SNPCL	Gas	-	4 999 95	-	-	-	387.00
Total Thermal (IPPs o	connected w		1,380.00	1,525.00	1,421.00	1,531.00	1,900.09
		C3: Thermal	(Others conn	ected with KE	L)		
PASMIC	Gas	-	9.00	21.00	0.00	0.00	0.00
Anoud Power	RFO/Gas	DO	84.00	95.00	69.00	55.00	44.00

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Power Station	Primary Fuel	Alternate Fuel	2013-14	2014-15	2015-16	2016-17	2017-18*
Intl. Steel Limited	Gas	-	67.00	67.00	60.00	57.00	56.00
Intl. Ind. Limited	Gas	_	8.00	8.00	10.00	13.00	12.00
FFBL Power	Imported	/Local Coal	-	-	-	62.00	438.00
Total Thermal (Others	connected v	with KEL)	168.00	191.00	139.00	187.00	550.00
Total Thermal K	EL (C1+C2+	C3)	10,257.00	11,035.00	11,883.00	11,865.00	12,788.09
			D: Nuclear	<u> </u>		i	-
CHASNUPP-I	NUC	NUC	2,194.00	2,455.00	1,486.00	2,118.00	2.433.42
CHASNUPP-II	NUC	NUC	2,208.00	2,541.00	2,368.00	2,315.00	2,301.74
CHASNUPP-III	NUC	NUC	-	-	-	1,435.00	2,246.55
CHASNUPP-IV	NUC	NUC	-	-	-	-	1,738.16
KANUPP	NUC	NUC	293.00	353.00	362.00	410.00	331.00
Total Nu	clear (D)		4,695.00	5,349.00	4,216.00	6,278.00	9,050.87
			E: Import	-	- 1		-
Import from Iran (Tavanir)			419.00	443.00	463.00	496.00	554.74
Total Import in P	EPCO system	ו (E)	419.00	443.00	463.00	496.00	554.74
	F: Re	newable Ener	rav (connected	with PEPCO	system)		
		F1:	Wind Power P	rojects	j ,		
Zorlu Enerji Pakistan	Wind	Wind	134.00	156.00	105.00	153.00	142.08
FFC Energy	Wind	Wind	129.00	139.15	125.00	123.00	120.08
Three Gorges First Wind Farm	Wind	Wind	-	80.00	135.00	138.00	126.06
Foundation Wind Energy-I	Wind	Wind	-	27.00	110.00	109.00	96.35
Foundation Wind Energy-II	Wind	Wind	-	56.00	116.00	120.00	112.30
Sapphire Wind	Wind	Wind	-	-	100.00	149.00	125.94
Yunus Energy	Wind	Wind	-	-	-	101.00	127.40
Metro Power Company	Wind	Wind	-	-	-	77.00	136.31
Gul Ahmad Wind	Wind	Wind	-	-	-	82.00	121.80
Master Wind Energy	Wind	Wind	-	-	-	82.00	127.01
Tenaga Generasi	Wind	Wind	-	-	-	65.00	90.18
HydroChina Dawood Power	Wind	Wind	-	-	-	40.00	102.78
Sachal Energy Development	Wind	Wind	-	-	-	34.00	127.55
UEP Wind Power	Wind	Wind	-	-	-	18.00	227.83
Artistic Wind Power	Wind	Wind	-	-	-	96.00	90.30
Tapal Wind Energy	Wind	Wind	-	-	-	-	86.38
Hawa Energy	Wind	Wind	-	-	-	-	68.31
Jhimpir Power	Wind	Wind	-	-	-	-	72.50
Three Gorges Second Wind Farm	Wind	Wind	-	-	-	-	16.48
Three Gorges Third Wind Farm	Wind	Wind	-	-	-	-	27.43
Total Wind Po	ower Project	5	263.00	458.15	691.00	1,387.00	2,145.07
		F2:	Solar Power P	rojects			
Quaid-e-Azam Solar Park	Solar	Solar	-	26.00	154.00	158.00	163.08
Appolo Solar	Solar	Solar	-	-	51.00	145.00	167.93
Best Green Solar	Solar	Solar	-	-	10.00	166.00	168.40
Crest Solar	Solar	Solar	-	-	10.00	166.00	169.80
AJ Power	Solar	Solar	-	-	-	-	11.52
Harappa Solar	Solar	Solar	-	-	-	-	21.43
Total Solar Po	ower Projects	5	0.00	26.00	225.00	635.00	702.17
		F3: Bagas	se/Biomass Po	wer Projects		F	
Jamal Din Wali-II	Bagasse	+Biomass	9.00	163.00	44.00	178.00	180.96
Jamal Din Wali-III	Bagasse	+Biomass	-	132.00	44.00	166.00	196.59
RYK Mills	Bagasse	Bagasse	-	32.00	14.00	122.00	155.61
Chiniot Power	Bagasse	Bagasse		-	169.00	296.00	346.02
Fatima Energy	Coal	Bagasse	-	1 -	5	143.00	20.87
Hamza Sugar Mills	Bagasse	+Biomass	-7	-	-	23.00	72.75

The Thal Industries Corporation Bagasse FO			-	-	-	-	87.08
Total Bagasse/Biomass	Power Pro	jects	9.00	327.00	271.00	928.00	1,059.88
Total Renewable Ener	gy (F1+F2+	-F3)	272.00	011 15	1 107 00	2 050 00	2 007 12
(connected with PEPO	CO system)	(F)	272.00	011.15	1,187.00	2,950.00	5,907.12
	G: SPP	s/CPPs/N-0	CPPs connecte	d with PEPCO	System		
	DISCO	Fuel				Energy Ge	en. (GWh)
	Disco	ruet				2016-17	2017-18
Sitara Energy (SPP)	FESCO	RFO				-	-
Galaxy Textile (N-CPP)	FESCO	Gas				-	-
Shakarganj Energy (CPP)	FESCO	Bagasse				-	-
Shakarganj Sugar Mills (CPP)	FESCO	Bagasse				1.16	0.00
Ramzan Sugar Mills (CPP)	FESCO	Bagasse				-	-
Noon Sugar Mills (CPP)	FESCO	Bagasse				0.40	3.32
Bhone Sugar Mills (CPP)	FESCO	Bagasse				0.00	0.00
Indus Sugar Mills (CPP)	MEPCO	Bagasse				5.33	0.00
Ashraf Sugar Mills (CPP)	MEPCO	Bagasse				13.05	-
Jamal Din Wali Sugar Mills (CPP)	MEPCO	Bagasse				15.52	-
Hamzah Sugar Mills (CPP)	MEPCO	Bagasse				5.57	-
Roomi Fabrics (CPP)	MEPCO	Gas				0.78	-
Roomi Fabrics (N-CPP)	MEPCO	Gas				0.17	-
Rahimyar Khan Sugar Mills (CPP)	MEPCO	Bagasse				-	-
Thal Industries (CPP)	MEPCO	Bagasse				0.00	-
Thatta Power (N-CPP)	HESCO	Gas				13.19	74.70
Anoud Textile (N-CPP)	HESCO	Gas				0.81	1.67
Agar Textile Mills (CPP)	HESCO	Gas				63.70	91.77
Faran Sugar Mills (CPP)	HESCO	Bagasse				4.32	4.10
Omni Power (N-CPP)	HESCO	Gas				10.25	65.46
Omni-1 (N-CPP)	HESCO	Gas				-	2.63
Omni-2 (N-CPP)	HESCO	Gas				-	2.59
Chamber Sugar Mills (CPP)	HESCO	Bagasse				1.72	1.41
Sanghar Sugar Mills (CPP)	HESCO	Bagasse				5.38	4.01
Bandhi Sugar Mills (CPP)	HESCO	Bagasse				7.85	6.07
Salim Yarn Mills (CPP)	HESCO	Gas				-	-
Mekotex (CPP)	HESCO	Gas				-	-
Hi-Tech Pipe & Engineering (CPP)	HESCO	Gas				12.20	5.05
Mehran Sugar Mills (CPP)	HESCO	Bagasse				3.45	2.65
TAY Sugar Mills (CPP)	HESCO	Bagasse				9.07	8.73
LUCKY Cement (N-CPP)	HESCO	Gas	4			47.85	159.60
Al Noor Sugar Mills (CPP)	SEPCO	Вадаѕѕе				13.57	11.53
Dharaki Sugar Mills (CPP)	SEPCO	Вадаѕѕе				-	-
Gnotki Sugar Mills (CPP)	SEPCO	вадаѕѕе				-	-
Dadu Energy (N-CPP)	SEPCO	Gas				5.89	103.69
Naudero Energy (N-CPP)	SEPCO	Gas				-	-
Lodra Power (N-CPP)	SEPCO	Gas				5.87	103.54
Lawah Sugar Mills (CPP)	LESCO	вадаѕѕе	4			- רא רו	-
Layyan Sugar Mills (CPP)	-	-	4			22.41	- 7.21
Kumhar Wala Powerhouse II (CPP)	-	-	4			1.04	7.51
Habib Sugar Mills (CDD)		Bagasse	1			0.20	2.39
	nnected wi	th DEDCO				-	5.52
Svetom (G)		1,108.00	1,015.00	251.00	271.40	665.53
Grand Total (A+B+(<u>.,</u> `+D+F+F+4	5)	105 698 95	108 916 72	114 092 66	120 621 78	133 668 60
		. ,	105,050.55	100,310.72	114,032.00	120,021.10	133,000.00

* Net Electricity Generation during FY 2017-18. Source: WAPDA/GENCOs/KEL/IPPs/CPPA-G

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TABLE 9 Electricity Generation by Systems and by Sectors (GWh)

Lectricity Generation by Systems and by Sectors (GWII)											
As on 30 th June	2013-14	2014-15	2015-16	2016-17	2017-18						
BY SYSTEM											
Total Electricity Generation in PEPCO System	95,441.95	97,881.72	102,209.66	108,756.78	120,880.51						
% Share (Generation in PEPCO System)	90.30	89.87	89.58	90.16	90.43						
Total Electricity Generation in KEL System	10,257.00	11,035.00	11,883.00	11,865.00	12,788.09						
% Share (Generation in KEL System)	9.70	10.13	10.42	9.84	9.57						
BY SECTOR											
Total Electricity Generation in Public Sector	48,915.28	50,174.55	54,041.24	56,079.28	52,201.16						
% Share (Generation in Public Sector)	46.28	46.07	47.37	46.49	39.05						
Total Electricity Generation in Private Sector	56,783.67	58,742.17	60,051.42	64,542.50	81,467.44						
% Share (Generation in Private Sector)	53.72	53.93	52.63	53.51	60.95						
Total Electricity Generation of the Country	105,698.95	108,916.72	114,092.66	120,621.78	133,668.60						
Note: See tables 7 and 8 for details and evolutions											

Note: See tables 7 and 8 for details and explanations. Source: WAPDA/GENCOs/KEL/IPPs/CPPA-G





[X]/

1	Units Generated by KEL O	wn (GWh)					
	Name of Plant		Vear	Units	Auxiliary Co	onsumption	Units Sent
			. cui	Generated	GWh	%	Out
			2013-14	3,765.00	341.00	9.06	3,424.00
	Bin Oasim Thermal Power S	Station-I	2014-15	3,925.00	360.00	9.17	3,565.00
1.1	(BOTPS-I)		2015-16	3,958.00	372.00	9.40	3,586.00
	Bin Qasim Thermal Power Station (BQTPS-I)		2016-17	4,329.00	412.00	9.52	3,917.00
			2017-18	4,765.00	431.00	9.05	4,334.00
			2013-14	3,639.00	237.00	6.51	3,402.00
	Bin Oasim Thermal Power S	Station-II	2014-15	3,907.00	251.00	6.42	3,656.00
1.2	(BOTPS-II)		2015-16	4,119.00	254.00	6.17	3,865.00
			2016-17	3,921.00	243.00	6.20	3,678.00
			2017-18	3,751.00	242.00	6.45	3,509.00
			2013-14	393.00	10.00	2.54	383.00
	Korangi Town Gas Turbine	Power	2014-15	435.00	11.00	2.53	424.00
1.3	Station-II		2015-16	500.00	14.00	2.80	486.00
	(KTGTPS-II)		2016-17	389.00	14.00	3.60	375.00
			2017-18	323.00	13.00	4.02	310.00
			2013-14	113.00	6.00	5.31	107.00
	Cita Cas Turkina Dawar Cta	tan II	2014-15	160.00	8.00	5.00	152.00
1.4		uon-n	2015-16	382.00	12.00	3.14	370.00
	(56125-11)		2016-17	384.00	13.00	3.39	371.00
			2017-18	498.00	16.00	3.21	482.00
			2013-14	799.00	64.00	8.01	735.00
			2014-15	892.00	74.00	8.30	818.00
1.5	Korangi Combined Cycle Po	ower Plant	2015-16	1,364.00	108.00	7.92	1,256.00
	5		2016-17	1,124.00	91.00	8.10	1,033.00
			2017-18	1,001.00	79.00	7.89	922.00
			2013-14	8,709.00	658.00	7.56	8,051.00
	T		2014-15	9,319.00	704.00	7.55	8,615.00
1.6	Iotal Units Generated from	KEL's Own	2015-16	10,323.00	760.00	7.36	9,563.00
	Power Plants		2016-17	10,147.00	773.00	7.62	9,374.00
			2017-18	10,338.00	781.00	7.55	9,557.00
2	Units Purchased by KEL (GWh)	•				
	• • • •		2013-14	2014-15	2015-16	2016-17	2017-18
2.1	KANUPP		293.00	353.00	362.00	410.00	331.00
2.2	Gul Ahmed		582.00	718.00	688.00	788.00	713.00
2.3	Tapal Energy		798.00	807.00	733.00	743.00	752.00
2.4	NTDC		5,441.00	5,427.00	5,059.00	5,077.00	5,128.00
2.5	PASMIC		9.00	21.00	0.00	0.00	0.00
2.6	Anoud Power		84.00	95.00	69.00	55.00	44.00
2.7	Intl. Steel Limited (19 MW)		67.00	67.00	60.00	57.00	56.00
2.8	Intl. Ind. Limited (4 MW)		8.00	8.00	10.00	13.00	12.00
2.9	FFBL Power		0.00	0.00	0.00	62.00	438.00
2.10	SNPCL		0.00	0.00	0.00	0.00	387.00
2.11	Total		7,282.00	7,496.00	6,981.00	7,205.00	7,861.00
2	Total Units Purchased by	KEL	15 001 00	16 015 00	17 204 00	17 252 00	10 100 00
5	including Own Generation	n (GWh)	15,991.00	10,615.00	17,504.00	17,352.00	18,199.00
4	Units Available for Distribut	ion (GWh)	15,333.00	16,111.00	16,544.00	16,579.00	17,418.00
5	Units Sold (GWh)		11,454.00	12,293.00	12,864.00	12,981.00	13,860.00
E	T&D Losses (excluding	GWh	3,879.00	3,818.00	3,680.00	3,598.00	3,558.00
0	Auxiliary Consumption)	%	25.30	23.70	22.24	21.70	20.43
7	Average Fuel Price		1				

TABLE 10 Electricity Statistics of K-Electric Limited

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		2013-14	2014-15	2015-16	2016-17	2017-18
7.1	Gas (Rs./MMBtu)	515.23*	488.23*	580.34*	511.00*	400.00*
7.2	RLNG (Rs./MMBtu)					1,401.00
7.3	Furnace Oil (Rs./M. Ton.)	65,906.00	51,391.00	27,550.00	35,067.00	45,591.00
8	Cost of Fuel in KEL Own System					
		2013-14	2014-15	2015-16	2016-17	2017-18
8.1	Cost of Fuel (Rs. in Million)	64,334.00	59,950.00	57,266.00	61,466.00	71,870.00
8.2	Cost of Fuel (Paisa/kWh)**	800.00	690.00	599.00	656.00	752.00

* GIDC pending court case. ** Based on per unit sent out. Source: KEL



 TABLE 11

 Thermal Electricity Generation by Fuel (GWh)

	2013-14	2014-15	2015-16	2016-17	2017-18*				
In PEPCO Area									
Gas**	23,877.00	23,921.94	29,497.42	31,520.24	23,291.97				
% share to the total thermal generation in PEPCO	41.30	40.76	47.74	47.08	29.37				
% share to the total thermal generation in the Country	35.07	34.31	40.04	39.99	25.29				
RLNG	0.00	0.00	0.00	657.88	20,678.32				
% share to the total thermal generation in PEPCO	0.00	0.00	0.00	0.98	26.08				
% share to the total thermal generation in the Country	0.00	0.00	0.00	0.83	22.45				
RFO	32,203.08	31,474.07	30,631.47	32,073.70	22,755.88				
% share to the total thermal generation in PEPCO	55.70	53.63	49.57	47.90	28.70				
% share to the total thermal generation in the Country	47.31	45.14	41.58	40.69	24.71				
HSD	1,625.23	3,186.29	1,512.28	1,704.54	788.18				
% share to the total thermal generation in PEPCO	2.81	5.43	2.45	2.55	0.99				
% share to the total thermal generation in the Country	2.39	4.57	2.05	2.16	0.86				
Coal	112.00	102.27	148.16	997.14	11,786.50				
% share to the total thermal generation in PEPCO	0.19	0.17	0.24	1.49	14.86				
% share to the total thermal generation in the Country	0.16	0.15	0.20	1.27	12.80				
Sub-Total	57,817.31	58,684.57	61,789.33	66,953.49	79,300.85				
% share to the total thermal generation in the Country	84.93	84.17	83.87	84.95	86.11				
	In KEL Ar	ea							
Gas‡	6,892.00	7,293.00	8,065.00	6,768.50	6,403.50				
% share to the total thermal generation in KEL	67.19	66.09	67.87	57.05	50.07				
% share to the total thermal generation in the Country	10.12	10.46	10.95	8.59	6.95				
RLNG	0.00	0.00	0.00	0.00	495.00				
% share to the total thermal generation in KEL	0.00	0.00	0.00	0.00	3.87				
% share to the total thermal generation in the Country	0.00	0.00	0.00	0.00	0.54				
	2013-14	2014-15	2015-16	2016-17	2017-18*				

RFO##	3,365.00	3,742.00	3,818.00	5,034.50	5,451.59			
% share to the total thermal generation in KEL	32.81	33.91	32.13	42.43	42.63			
% share to the total thermal generation in the Country	4.94	5.37	5.18	6.39	5.92			
HSD	0.00	0.00	0.00	0.00	0.00			
% share to the total thermal generation in KEL	0.00	0.00	0.00	0.00	0.00			
% share to the total thermal generation in the Country	0.00	0.00	0.00	0.00	0.00			
Coal	0.00	0.00	0.00	62.00	438.00			
% share to the total thermal generation in KEL	0.00	0.00	0.00	0.52	3.43			
% share to the total thermal generation in the Country	0.00	0.00	0.00	0.08	0.48			
Sub-Total	10,257.00	11,035.00	11,883.00	11,865.00	12,788.09			
% share to the total thermal generation in the Country	15.07	15.83	16.13	15.05	13.89			
In the Country								
Gas	30,769.00	31,214.94	37,562.42	38,288.74	29,695.47			
% share to the total thermal generation in the Country	45.20	44.77	50.99	48.58	32.25			
RLNG	0.00	0.00	0.00	657.88	21,173.32			
% share to the total thermal generation in the Country	0.00	0.00	0.00	0.83	22.99			
RFO	35,568.08	35,216.07	34,449.47	37,108.20	28,207.47			
% share to the total thermal generation in the Country	52.25	50.51	46.76	47.08	30.63			
HSD	1,625.23	3,186.29	1,512.28	1,704.54	788.18			
% share to the total thermal generation in the Country	2.39	4.57	2.05	2.16	0.86			
Coal	112.00	102.27	148.16	1,059.14	12,224.50			
% share to the total thermal generation in the Country	0.16	0.15	0.20	1.34	13.27			
Total	68,074.31	69,719.57	73,672.33	78,818.49	92,088.94			

* Net Electricity Generation during FY 2017-18 . [†] Including generation of IPPs in KEL system. Source: GENCOs/KEL/IPPs/CPP-G

** Including generation of SPPs/CPPs/N-CPPs in PEPCO system. [#] Including generation of IPPs/CPPs in KEL system.

10.3 COST OF GENERATION, FUEL COST AND FUEL CONSUMPTION

The following tables (table 12 to 14) represent cost of electricity generation, fuel cost and fuel consumption from 2013-14 to 2017-18:

	Fuel Consumption and Cost of Generation Data (GENCOs)												
_		Gen. on	Gas Consumption		Gen. on	RFO Cons	sumption	Gen. on	Cost of	Overall Fuel			
Station	Year	Gas (GWh)	Total (MMCFT)	Cft/kWh (Average)	RFO (GWh)	(000 M.Ton)	(Kg/ kWh)	RLNG (GWh)	Generation (Paisa/kWh)	Cost of Generation (Rs. Million)			
	2013-14	2,951.00	623.00	12.09	46.00	852.00	0.26		1,980.76	n.a.			
TPS	2014-15	414.02	5,009.00	12.10	2,241.09	672.00	0.30		1,356.38	n.a.			
Jamshoro	2015-16	2,413.73	31,095.57	12.88	832.73	252.68	0.30		878.00	28,509.57			
(GENCO-I)	2016-17	1,141.37	14,085.16	12.34	2,112.19	619.53	0.29		975.00	31,727.31			
	2017-18	525.80	8,782.00	12.33	1,088.24	328.59	0.30	178.01	1,130.00	20,252.92			
6.0.6	2013-14	45.00	814.00	15.73	0.00	0.00	0.00		1,645.13	n.a.			
SPS Feiseleked	2014-15	7.21	176.00	15.27	39.89	14.00	0.33		1,957.00	n.a.			
Falsalabad	2015-16	85.84	1,328.00	13.79	0.00	0.00	0.00		1,016.00	871.90			
(GENCO-	2016-17	62.25	971.18	13.77	45.43	15.55	0.30		1,266.80	1,279.21			
111)	2017-18	6.26	85.13	11.86	0.00	0.00	0.00	0.00	4,094.50	41.29			

TABLE 12 Consumption and Cost of Generation Data (GENCOs

Dowor		Con on Cos	Gas Cor	nsumption	Cost of Constation	Overall Fuel Cost
Station	Year	(GWh)	Total (MMCFT)	Cft/kWh (Average)	(Paisa/kWh)	of Generation (Rs. Million)
	2013-14	169.98	2,144.00	11.98	799.63	n.a.
	2014-15	306.11	3,702.00	12.09	699.97	n.a.
	2015-16	582.02	7,139.00	12.27	824.00	4,794.77
(GENCO-I)	2016-17	338.67	4,203.28	12.41	730.00	2,473.40
	2017-18	94.92	1,259.00	13.26	678.00	643.16
	2013-14	1,257.00	15,755.00	12.06	671.00	n.a.
TPS Guddu	2014-15	522.00	9,488.00	16.51	758.00	n.a.
(Units 1-4)	2015-16	148.64	2,501.43	16.34	864.78	1,427.51
(GENCO-II)	2016-17	227.08	3,395.32	14.95	837.55	1,901.92
	2017-18	258.11	4,209.89	14.81	609.80	
	2013-14	3,100.00	31,992.00	9.93	518.00	n.a.
TPS Guddu	2014-15	4,990.00	31,539.00	10.33	495.00	n.a.
(Units 5-13)	2015-16	2,330.44	28,791.89	14.10	757.75	15,084.62
(GENCO-II)	2016-17	3,308.36	41,723.13	13.26	626.77	19,234.42
	2017-18	4,661.92	60,070.07	13.73	533.44	23,328.41
TPS Guddu	2015-16	3,551.47	32,113.09	9.04	510.55	17,812.35
(Units 14-16)	2016-17	4,543.55	40,375.55	17.53	446.01	20,264.78
(GENCO-II)	2017-18	3,855.08	39,464.48	10.04	413.31	16,242.95
	2013-14	87.19	1,549.00	18.29	930.86	n.a.
TPS Quetta	2014-15	98.03	1,692.00	16.98	866.89	n.a.
(Isolated	2015-16	111.29	1,914.49	17.20	1,169.98	1,302.07
Generation)	2016-17	53.32	934.52	17.53	1,162.89	620.09
(GENCO-II)	2017-18	0.00	0.00	0.00	0.00	0.16
<u>.</u>						
Derman		Gen. on Ga	s Consumption	Gen. on RLNG C	onsumption Cos	t of Overall Fuel

_		Gen. on	Gas Cons	sumption	Gen. on	RLNG Co	nsumption	Cost of	Overall Fuel	
Power Station	Year	Gas Total Cft/kWh (GWh) (MMCFT) (Average		Cft/kWh (Average)	RLNG (GWh)	Total (MMCFT)	Cft/kWh (Average)	Generation (Paisa/kWh)	Generation (Rs. Million)	
	2013-14	120.00	2,613.00	13.25				724.00	n.a.	
GTPS	2014-15	29.88	394.00	12.46				526.26	n.a.	
Faisalabad	2015-16	275.16	3,631.00	12.54				858.00	2,360.82	
(GENCO-III)	2016-17	214.62	2,718.97	12.04				772.21	1,371.20	
	2017-18	14.68	1,297.21	11.71	90.61	n.p.	n.p.	1,780.89	1,609.00	

		Gen on	Gas Con	sumption		RFO Consu	mption	Gen on	RLNG Cor	nsumption	Cost of	Overall Fuel
Power Station	Year	Gas (GWh)	Total (MMCFT)	Cft/kWh (Average)	Gen. on RFO (GWh)	(000 M.Ton)	(Kg/ kWh)	RLNG (GWh)	Total (MMCFT)	Cft/kWh (Average)	Generation (Paisa/kWh)	Cost of Generation (Rs. Million)
TPS	2013-14	8.45	296.00	36.25	5,134.00	1,474.00	0.26				1,898.83	n.a.
Muzaffar	2014-15	0.00	0.00	0.00	4,306.05	1,250.00	0.26				1,501.36	n.a.
garh	2015-16	344.38	4,641.00	12.23	4,300.27	1,285.00	0.27				986.00	45,786.78
(GENCO-	2016-17	0.00	11.00	0.00	5,160.13	1,552.16	0.27				1,108.43	59,029.58
III)	2017-18	28.56	384.13	10.62	2,892.01	8,799.58	0.27	119.79	1,575.75	12.44	1,372.18	41,731.74

Power	Voor	Gen.	Gas Consumption		Gen.	RFO Consumption		Gen. on Cons		SD nption	Cost of	Overall Fuel Cost of
Station	rear	(GWh)	Total (MMCFT)	Cft/kWh (Average)	(GWh)	(000 M.Ton)	(Kg/ kWh)	(GWh)	(000 Ltrs.)	(Kg/ kWh)	(Paisa/kWh)	Generation (Rs. Million)
TPS	2014-15	0.00	0.00	0.00	n.p	n.p.	n.p.	244.00	n.p.	n.p.	n.p.	n.a.
Nandipur	2015-16	0.00	0.00	0.00	1,265.52	296.00	0.22	2.26	711.00	n.p.	825.00	10,458.84
(GENCO-	2016-17	550.59	4,822.60	8.47	828.37	181.92	0.21	0.09	-	0.39	831.00	11,919.62
III)	2017-18*	2,381.70	2,133.61	8.57	0.00	0.00	0.00	0.00	0.00	0.00	898.00	222,138.18

	FBC Lakhara (GENCO-IV)												
Year	Generation on Coal (GWh)	Coal Consumption (000 M. Tons)	Coal Consumption (kg/kWh)	Cost of Generation (Paisa/kWh)	Overall Fuel Cost of Generation (Rs. Million)								
2013-14	112.00	160.71	1.03	422.86	n.a.								
2014-15	102.27	151.00	1.04	465.98	n.a.								
2015-16	148.16	152.22	1.03	1,171.80	612.30								
2016-17	123.97	123.90	0.99	1,359.21	500.54								
2017-18	3.39	5.30	1.01	2,023.72	22.50								

Note: Net Electricity Generation during FY 2017-18. * Electricity Generation on RLNG. Source: GENCOs

 TABLE 13

 Fuel Consumption and Cost of Generation Data (K-Electric Limited and their IPPs)

			(Gas+RFO+RLP	NG based Powe	er Plant)			
Damar		Gen. on	Gas Con	sumption	Conton	RFO Consun	nption	Gen. on	Overall Gen.
Station	Year	Gas (GWh)	Total MMCFT	CFT/kWh (Average)	RFO (GWh)	Total (000 M. Tons)	(kg/ kWh)	RLNG (GWh)	Cost (Rs./kWh)**
	2013-14	1,865.00	19,624.00	10.50	1,900.00	497.00	0.26		12.49
Bin	2014-15	1,803.00	18,313.00	10.20	2,122.00	568.00	0.30		10.73
Qasim	2015-16	1,630.00	16,353.00	10.00	2,328.00	623.00	0.30		7.51
TPS-I	2016-17	880.50	8,867.00	10.10	3,448.50	913.00	0.30		9.43
	2017-18*	783.50	8,558.00	9.80	3,894,50	1.016.00	0.30	87.00	11.72

	(Gas+RLNG based Power Plant)												
Power	Veer	Gen. on Gas	Gas C	onsumption	Gen. on RLNG	Overall Generation							
Station	rear	(GWh)	Total MMCFT	CFT/kWh (Average)	(GWh)	Cost (Rs./kWh)**							
	2013-14	3,639.00	30,333.00	8.00		4.54							
	2014-15	3,907.00	30,775.00	7.90		4.17							
TPS-II	2015-16	4,119.00	31,577.00	7.70		5.00							
	2016-17	3,921.00	30,153.00	7.70		4.38							
	2017-18*	3,524.00	27,619.00	7.40	227.00	3.85							
	2013-14	393.00	4,140.00	10.50		5.12							
Korangi Town	2014-15	435.00	4,321.00	9.90		4.76							
	2015-16	500.00	4,769.00	9.50		5.54							
GTPS-II	2016-17	389.00	3,631.00	9.30		5.01							
	2017-18*	287.00	3,036.00	9.40	36.00	4.91							
	2013-14	113.00	1,216.00	10.80		5.41							
	2014-15	160.00	1,659.00	10.40		4.90							
Site GTPS-II	2015-16	382.00	3,659.00	9.60		5.73							
	2016-17	384.00	3,517.00	9.20		4.97							
	2017-18*	457.00	4,307.00	8.60	41.00	4.48							
	2013-14	799.00	6,961.00	8.70		4.87							
	2014-15	892.00	7,453.00	8.40		4.51							
Korangi	2015-16	1,364.00	10,525.00	7.70		4.94							
CCPP	2016-17	1,124.00	8,848.00	7.90		4.55							
	2017-18*	897.00	7,310.00	7.30	104.00	4.22							

* Firm quantity of 60 MMCFD RLNG is being supplied to KEL on co-mingled basis by SSGC along with supply of indigenous Natural Gas on as and when available basis with effect from April, 2018.** Based on Units Sent Out

	(Residual Furnace Oil based Power Plant)												
Power Station	Year	Gen. on RFO (GWh)	Quantity of RFO used (000 M. Tons)	Average Fuel Cost (Rs./kWh)	Overall Generation Cost (Rs./kWh)								
	2013-14	582.00	n.p.	n.p.	18.46								
Gul Ahmed	2014-15	718.00	n.p.	n.p.	14.42								
	2015-16	688.00	n.p.	n.p.	9.52								
	2016-17	788.00	186.26	7.86	10.38								
	2017-18	747.63	170.46	9.88	12.70								
	2013-14	798.00	n.p.	n.p.	17.95								
	2014-15	807.00	n.p.	n.p.	14.35								
Tapal Energy	2015-16	733.00	n.p.	n.p.	9.62								
	2016-17	743.00	164.66	7.57	8.91								
	2017-18	765.46	166.70	9.46	10.76								

Source: KEL/IPPs

National Electric Power Regulatory Authority

	(Residual Furnace Oil based Power Plant)												
Power Station	Year	Units Generated (GWh)	Quantity of RFO Used (000 M. Tons)	Average Fuel Cost (Rs./kWh)	Overall Generation Cost (Rs./kWh)								
	2013-14	2,081.00	495.58	16.66	18.88								
	2014-15	1,663.00	391.22	12.00	14.32								
Lal Pir	2015-16	1,946.10	438.43	6.79	8.87								
Power	2016-17	1,601.09	364.37	8.42	10.98								
	2017-18	1,089.06	269.53	10.16	13.70								
	2013-14	2,031.00	489.37	16.81	19.31								
	2014-15	1,222.00	289.60	14.53	17.06								
Pak Gen.	2015-16	878.13	199.26	5.75	10.17								
Power	2016-17	1,727.18	394.61	8.33	10.72								
	2017-18	1,237.28	305.85	10.11	13.25								
	2013-14	7,086.00	1,681.64	16.73	18.86								
	2014-15	6,809.00	1,609.46	13.58	15.89								
Hub Power	2015-16	7,546.99	1,803.39	7.06	9.06								
	2016-17	6,793.11	1,635.36	8.77	10.99								
	2017-18	5,196.60	1,245.89	11.58	16.08								
	2013-14	129.00	33.26	17.46	22.92								
Caba	2014-15	35.00	8.92	16.46	17.63								
Saba Power	2015-16	70.59	17.16	7.68	9.84								
	2016-17	510.46	123.88	10.63	11.85								
	2017-18	465.88	120.21	12.59	14.12								
	2013-14	890.00	172.04	15.65	16.99								
Kabingar	2014-15	877.00	169.39	12.05	13.36								
Energy	2015-16	877.41	164.44	7.23	8.54								
Lifergy	2016-17	816.83	153.15	7.70	9.09								
	2017-18	645.40	124.92	9.44	11.35								
	2013-14	1,243.00	225.24	14.87	17.43								
Attock	2014-15	1,209.00	222.89	10.19	18.21								
Gen	2015-16	1,179.30	216.41	5.20	9.77								
Con.	2016-17	1,135.41	209.54	6.92	10.95								
	2017-18	912.45	174.29	8.95	14.4								
	2013-14	1,519.00	294.60	13.57	16.38								
Atlas	2014-15	1,462.00	283.96	15.92	19.21								
Power	2015-16	1,320.46	261.81	n.p.	n.p.								
	2016-17	1,336.90	262.56	n.p.	n.p.								
	2017-18	1,246.45	n.p.	n.p.	n.p.								
	2013-14	1,464.00	288.00	14.17	16.80								
Nishat	2014-15	1,410.00	277.31	11.07	13.64								
Power	2015-16	1,2/2.16	250.24	6.52	6.52								
	2016-17	1,239.76	243.87	7.55	7.55								
	2017-18	1,1/1.19	230.38	9.29	9.29								
	2013-14	1,4/1.00	289.44	14.12	16.81								
Nishat	2014-15	1,415.31	278.40	11.05	13.//								
Chunian	2015-16	1,240.16	243.94	/.44	8.97								
	2016-17	1,350.33	265.61	8./1	9.76								
	2017-18	1,099.67	221.80	10.41	11./3								

 TABLE 14

 Fuel Consumption and Cost of Generation Data (IPPs)

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Power Station	Year	Units Generated (GWh)	Quantity of RFO Used (000 M. Tons)	Average Fuel Cost (Rs./kWh)	Overall Generation Cost (Rs./kWh)
	2013-14	1,520.00	298.90	14.27	17.06
Liberty Power	2014-15	1,514.57	297.92	15.42	18.57
	2015-16	1,277.44	235.39	n.p.	n.p.
Tech.	2016-17	1,369.33	255.20	n.p.	n.p.
	2017-18	1,175.61	224.14	n.p.	n.p.
	2013-14	1,562.39	308.59	14.28	18.33
Naroual	2014-15	1,418.16	278.76	11.73	16.26
Eporeu	2015-16	1,161.91	229.65	6.68	11.75
Energy	2016-17	1,334.18	262.33	7.96	12.78
	2017-18	1,199.68	234.04	9.39	14.59

(Gas based Power Plant)												
Power Station	Voar	Units Generated	Quantity of Gas	Average Fuel	Overall Generation							
Fower Statton	Teal	(GWh)	used (MMBTU)	Cost (Rs./kWh)	Cost (Rs./kWh)							
	2013-14	205.00	2021299	5.63	7.63							
Altorp	2014-15	173.00	1744940	5.37	7.38							
Energy	2015-16	184.60	1736978	6.35	7.56							
Lifergy	2016-17	198.30	1868543	5.91	6.99							
	2017-18	145.12	n.p.	n.p.	n.p.							
	2013-14	1,191.00	10203547	4.42	5.50							
Fauii	2014-15	991.00	8514108	4.62	6.02							
Fauji	2015-16	1,138.06	1419944	6.53	7.26							
Kabirwala	2016-17	1,122.84	709502	8.34	9.09							
	2017-18	1,017.26	404931	9.16	9.94							
	2013-14	670.00	5734357	4.65	7.40							
11.1.1.1.1.1.1.1.	2014-15	719.00	6187693	4.63	7.06							
Habibullah Coastal	2015-16	563.03	4889875	6.04	9.28							
	2016-17	785.90	6533436	n.p.	n.p.							
	2017-18	880.33	7416480	n.p.	n.p.							
	2013-14	2,760.00	20002297	4.63	5.89							
	2014-15	2,465.00	19635093	4.49	7.22							
Rousch	2015-16	2,970.66	23833821	5.94	7.44							
Power	2016-17	2,459.69	19781549	7.61	9.53							
	2017-18*	2,591.64	21012425	8.58	10.20							
	2013-14	943.00	7640542	17.40	22.52							
	2014-15	1,218.00	10004282	12.39	14.66							
INB Liberty	2015-16	1,491.36	12003012	6.06	7.82							
Power	2016-17	1,430.23	11611024	4.79	5.81							
	2017-18	1,041.56	8776938	6.47	8.49							
	2013-14	1,440.71	11881740	5.06	5.37							
F P	2014-15	1,429.00	11993204	5.06	5.37							
Engro Power	2015-16	1,222.00	10196067	5.69	8.99							
Gen. Qadirpur	2016-17	1,731.00	13923051	5.04	10.66							
	2017-18	1,668.42	13221041	4.16	9.02							
	2013-14	54.00	397509	7.14	11.17							
	2014-15	70.00	655291	6.49	10.10							
Davis	2015-16	74.00	691918	6.49	10.10							
Energen.	2016-17	61.05	516629	8.04	9.11							
	2017-18*	8.82	85456	15.46	16.15							

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		Ga	IS		RF	0			Average		Overall
Power Station	Year	Units Generated (GWh)	Quantity of Gas used (MMBTU)		Units Generated (GWh)	Quantity of RFO used (000 M.Tons)	Ger (HSD neration GWh)	Fuel Co (Rs./kW	ge ost Vh)	Generation Cost (Rs./kWh)
	2013-14	306.00	3116	410	6,027.00	1,233.30		146.00	14	.04	20.00
KAPCO	2014-15	845.00	8097	993	5,852.00	1,179.96		236.00	13	.37	16.39
(Dual	2015-16	1,069.33	9322	.082	5,462.31	1,073.38		225.33	6	.81	7.71
Fuel)	2016-17	2,571.00	22502	701	4,713.00	917.99		240.00	8	.46	9.23
	2017-18*	4,101.22	36631	183	3,272.72	631.95		62.81	9	.82	10.56
_				200						0	
Power Station	Power Year Station		Units Gene-		antity of Gas	HSD Gene- ration (GWh)		Average		r	ation Cost
	2012.1	rated (GWh)	use	ed (MMBTU)		,		45.64		(Rs./kWh)
	2013-14	+	267.79		2051567	493.	00		15.61		20.95
Sapphire	2014-15	> -	289.50		2153880	653.	17		14.60		19.24
Electric	2015-16	7	121.20		5409221	329.	07		7.48		7.80
	2010-17	*	595.04 642.90		4414191	394.	07		9.10		9.49
	2017-16	1	043.09		4003047	171.	07		9.70		10.02
	2013-12	-	265.09		2037078	458.	44		15.47		21.50
Saif	2014-13	5	95.48		6202115	0/5.4	44 71		16.01		21.83
Power	2015-10	7	045.07 400.64		200592115	243. 405	/ I 01		11 02		0.09
	2010-11	*	499.04		5005005 E146022	405.	20		10.25		15.15
	2017-10	1	266 17		2065260	160.	20		12.60		15.07
	2013-12	+	311.19		22003500	725	22 81		11.00		18 17
Orient	2014-1	5	840 14		6/2129/	315	/8		7 38		8 50
Power	2015-1	7	568 57		4366253	376	11		10.21		11.62
	2017-18	*	697 51		5270563	143	143.88		9.98		12.19
	2013-14	1 1	359.00		10563546	113.	-		4 91		7 25
	2014-1	5 1	304 70		10421325	17	30		4 36		7.23
Foundation	2015-16	5 1.	211.26		9539800	0.22		2 54			7.98
Power	2016-17	7 1,	382.65		9830259	0.	0.20		4.69		7.25
	2017-18	3 1,	392.39		10818257		-		3.97		5.00
	2013-14	1	250.19		n.p.	253.	91		6.10		13.66
	2014-15	5	92.91		n.p.	620.	24		9.43		13.98
Halmore	2015-16	5	540.00		4087127	376.	00		13.34		20.97
Power	2016-17	7	274.00		2172844	279.	00		13.80		5.53
	2017-18	*	624.87		4953062	246.	14		10.26		15.24
	2013-14	4,	314.00		30644390		-		3.01		5.63
	2014-15	5 4,	126.91		31549804	4.	00		2.93		5.08
Uch Power	2015-16	5 4,	210.83		32101860	3.	13		4.38		6.44
	2016-17	7 4,	404.46		33657865	1.	98		n.p.		n.p.
	2017-18	3 4,	442.99		33721523		-		n.p.		n.p.
	2013-14	1	752.00		n.p.		-		3.45		6.18
Uch-II	2014-15	5 2,	409.00		18014780	10.	00		1.08		1.94
Power	2015-16	5 2,	315.84		17423515	16.	98		n.p.		n.p.
	2016-17	7 2,	724.06		20340852	7.	28		n.p.		n.p.
	2017-18	3 2,	593.04		19524716		-		n.p.		n.p.

* During FY 2017-18 Electricity Generated on RLNG instead of Gas at Rousch Power, Davis Energen, KAPCO, Sapphire Electric, Saif Power, Orient Power and Halmore Power Plant.

Note: Net Electricity Generation during FY 2017-18. Source: IPPs

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10.4 AUXILIARY CONSUMPTION AND OTHER FACTORS, HEAT RATE AND PLANT EFFICIENCY

The following tables (table 15 to 22) show the auxiliary consumption and other factors such as maximum load, load factor, capacity factor, utilization factor, heat rate and plant efficiency data of power plants from 2013-14 to 2017-18:

	Лил						
Power	Year	Auxiliary Co	onsumption	Maximum	Load Factor	Capacity	Utilization
Station		(GWh)	(%)	Load (MW)	(%)	Factor (%)	Factor (%)
	2013-14	16.07	0.10	3,605	47.93	103.65	49.68
	2014-15	15.94	0.11	3,605	46.89	103.65	48.61
larbela	2015-16	16.79	0.10	3,606	50.48	103.68	52.34
	2016-17	16.16	0.11	3,539	48.41	101.75	49.40
	2017-18	17.33	0.13	3,453	43.47	99.28	43.16
	2013-14	9.61	0.11	1,450	55.02	100.00	55.02
Ghazi	2014-15	7.75	0.12	1,450	52.70	100.00	57.94
Barotha	2015-16	9.92	0.15	1,450	52.77	100.00	58.25
Barotria	2016-17	9.64	0.14	1,450	54.21	100.00	59.61
	2017-18	10.28	0.16	1,450	47.27	100.00	47.27
	2013-14	10.08	0.17	1,115	59.95	111.50	66.84
	2014-15	11.31	0.17	1,115	66.51	111.50	73.86
Mangla	2015-16	11.81	0.26	1,115	52.77	111.50	78.15
	2016-17	90.30	1.69	1,115	54.60	111.50	61.05
	2017-18	11.40	0.28	1,115	42.29	128.75	47.15
	2013-14	1.58	0.16	201	52.89	82.73	43.77
	2014-15	1.63	0.17	185	60.17	76.14	45.82
Warsak	2015-16	1.65	0.18	205	51.33	84.37	43.31
	2016-17	4.73	0.48	213	52.67	87.67	52.67
	2017-18	3.03	0.33	221	47.21	90.96	43.06
	2013-14	6.05	0.58	184	63.75	100.00	63.76
	2014-15	5.64	0.01	184	61.22	100.00	61.22
Chashma	2015-16	6.33	0.70	174	58.70	58.69	55.50
	2016-17	5.74	0.64	158	64.15	85.87	82.23
	2017-18	4.76	0.63	129	66.90	70.11	46.77
	2013-14	1.24	1.80	72	41.24	41.40	41.24
	2014-15	4.40	1.99	72	40.11	40.11	40.11
Khan Khwar	2015-16	0.89	2.36	68	6.32	5.97	5.97
	2016-17	4.01	2.01	72	31.47	31.56	31.56
	2017-18	3.40	1.99	72	27.02	27.02	27.02
	2013-14	0.84	0.18	121	44.45	90.95	44.45
	2014-15	0.79	0.17	121	44.19	78.32	43.44
Allai Khwar	2015-16	0.80	0.14	121	53.33	53.33	53.33
	2016-17	0.86	0.22	121	37.42	37.42	37.42
	2017-18	0.71	0.26	121	25.96	26.03	25.96
	2013-14	3.18	1.10	70	48.25	61.44	35.18
	2014-15	2.91	1.50	45	47.95	47.29	22.67
Jinnah	2015-16	6.67	2.25	66	51.27	68.54	35.14
Junian	2016-17	2.88	0.98	63	52.89	34.71	34.71
	2017-18	2.99	1.30	52	50.41	54.17	27.30
	2013-14	0.19	0.07	130	65.55	59.71	64.77
	2014-15	0.74	0.12	130	53.59	100.00	53.59
Duber	2015-16	0.73	0.11	130	57.36	100.00	57.36
Khwar	2016-17	0.71	0.12	130	51.62	100.00	51.76
	2017-18	3.90	0.76	130	45.08	45.20	45.08

TABLE 15 Auxiliary Consumption and other Factors (Hydel Power Stations)

17.

State of Industry Report 2018 = = = = = = =

Power		Auxiliary Co	onsumption	Maximum	Load Factor	Capacity	Utilization
Station	Year	(GWh)	(%)	Load (MW)	(%)	Factor (%)	Factor (%)
	2013-14	0.30	0.33	18	56.65	68.50	50.98
	2014-15	0.41	0.39	18	67.59	79.52	60.63
Dargai	2015-16	0.42	0.36	18	71.67	78.11	65.22
5	2016-17	0.28	0.27	18	67.03	81.50	59.82
	2017-18	0.27	0.28	18	61.22	89.00	54.48
	2013-14	0.80	1.52	13	47.85	56.82	28.10
	2014-15	2.80	4.18	14	67.27	63.64	36.36
Rasul	2015-16	2.59	3.99	18	60.71	62.61	38.15
	2016-17	3.66	4.23	15	65.83	68.18	44.88
	2017-18	1.58	2.41	15	49.74	68.18	33.92
	2013-14	0.39	1.27	6	55.59	39.81	25.94
	2014-15	0.44	1.70	5	60.87	36.30	22.10
Shadiwal	2015-16	0.63	2.25	5	63.24	35.75	21.50
	2016-17	0.46	1.60	6	62.01	34.79	27.81
	2017-18	0.46	1.77	6	53.67	31.84	21.09
	2013-14	0.40	1.09	9	46.31	58.25	31.58
Chi sh shi	2014-15	0.35	0.89	7	53.88	53.03	28.57
Chichoki	2015-16	0.58	1.21	7	55.54	56.82	51.99
Mallan	2016-17	0.35	0.78	8	48.71	60.61	29.63
	2017-18	0.32	0.82	7	51.11	53.03	27.52
	2013-14	0.50	1.18	9	52.03	66.67	34.69
	2014-15	0.81	2.30	9	43.09	66.67	28.72
Nandipur	2015-16	0.67	1.64	9	58.10	53.08	33.63
	2016-17	0.54	1.25	11	46.35	61.86	38.89
	2017-18	0.55	1.29	9	56.58	66.67	37.18
	2013-14	0.44	2.09	4	57.16	100.00	54.30
Kurrana	2014-15	0.54	2.70	4	56.25	100.00	56.25
Carbi	2015-16	0.65	2.81	4	66.61	98.25	61.36
Garni	2016-17	0.36	1.94	4	55.25	95.00	52.63
	2017-18	0.15	0.92	4	51.66	95.00	49.08
	2013-14	0.02	0.68	1	56.14	45.65	30.00
	2014-15	0.04	1.60	1	54.83	43.79	25.67
Renala	2015-16	0.04	1.93	1	54.92	33.94	20.99
	2016-17	0.00	2.11	1	41.82	38.83	24.88
	2017-18	0.05	1.99	1	43.78	37.50	26.27
	2013-14	0.01	0.30	1	42.02	103.20	41.90
	2014-15	0.01	0.19	1	46.36	102.90	42.09
Chitral	2015-16	0.01	0.19	1	49.90	82.03	40.95
	2016-17	0.01	0.20	1	59.83	47.99	69.96
	2017-18	0.01	0.24	1	49.13	39.42	39.30
	2013-14	0.02	0.38	17	16.99	17.80	17.00
	2014-15	0.18	2.04	17	31.01	66.00	31.00
Gomal Zam	2015-16	0.05	0.95	17	9.41	10.03	9.43
	2016-17	0.05	0.91	17	4.04	9.75	4.13
	2017-18	0.00	0.07	8	0.52	0.53	0.24
	2013-14	0.58	0.77	22	38.37	100.00	38.37
Malakand	2014-15	0.92	0.76	22	61.85	81.25	76.12
	2015-16	1.49	0.83	22	71.55	71.36	71.55
Jannali	2016-17	1.19	0.96	22	64.41	64.41	64.41
	2017-18	1.18	1.12	22	54.68	54.68	54.68

Source: WAPDA

	Auxiliary Consumption and other Factors (GENCOs)												
Dames Ctation	Veer	Auxiliary Co	onsumption	Maximum	Load Factor	Capacity	Utilization						
Power Station	rear	(GWh)	(%)	Load (MW)	(%)	Factor (%)	Factor (%)						
	2013-14	345.71	10.47	722	52.07	84.94	53.70						
	2014-15	351.51	11.76	670	50.80	78.82	48.62						
(GENCO-I)	2015-16	354.02	9.83	740	79.86	48.22	83.24						
(GENCO-I)	2016-17	356.17	9.87	690	83.22	48.48	58.04						
	2017-18	214.07	10.67	650	79.17	26.94	32.25						
	2013-14	10.10	5.64	119	17.13	68.39	14.56						
CTDC // / ·	2014-15	13.46	4.22	126	28.83	72.41	25.94						
GIPS Kotri	2015-16	21.20	3.51	118	58.20	47.82	57.23						
(GENCO-I)	2016-17	13.63	3.87	105	38.30	27.93	33.51						
	2017-18	6.89	6.77	102	11.39	59.86	8.07						
	2013-14	114.42	8.76	190	78.27	29.69	34.99						
TPS Guddu	2014-15	52.72	9.18	230	28.44	35.94	15.39						
(Units 1-4)	2015-16	12.49	8.42	210	12.05	65.63	54.06						
(GENCO-II)	2016-17	16.06	7.07	150	17.28	60.61	12.34						
· · · ·	2017-18	25.43	8.95	150	21.63	71.43	19.09						
	2013-14	54.87	1.70	620	59.13	61.08	50.22						
TPS Guddu	2014-15	62.74	2.05	1.120	31.05	110.34	47.64						
(Units 5-13)	2015-16	51.47	1.40	279	40.08	25.27	68.43						
(GENCO-II)	2016-17	59.82	1.39	440	40.58	82.77	41.68						
()	2017-18	66.92	1.06	430	58.30	99.13	62.65						
TPS Guddu	2015-16	72.24	2.03	740	54.64	54.27	80.00						
(Units 14-16)	2016-17	103.93	2 29	765	67.80	100.00	69.43						
(GENCO-II)	2017-18	74 90	1 91	769	58.34	100.30	62.24						
	2013-14	2.26	2.67	25	38.57	71.43	38 57						
TPS Quetta	2014-15	1.52	1 53	25	45 38	71.13	45 38						
(Isolated	2015-16	1.57	1.41	25	50.68	100.00	50.68						
Generation)	2016-17	0.99	1.85	22	27.67	88.00	24.35						
(GENCO-II)	2017-18	0.37	0.00	0	0.00	0.00	0.00						
	2013-14	596.52	10.41	1,157	56.37	85.70	57.72						
TPS	2014-15	548.09	11.27	1,055	52.48	78.15	48.99						
Muzaffargarh	2015-16	502.85	9.77	1,100	52.94	82.22	43.53						
(GENCO-III)	2016-17	540.74	9.49	1,100	59.16	81.48	48.21						
	2017-18	342.22	10.15	1,100	34.99	81.48	28.51						
	2013-14	7.89	15.25	70	8.42	53.03	5.89						
	2014-15	6.60	11.69	79	8.14	59.85	6.43						
	2015-16	10.90	11.31	45	24.37	34.09	11.42						
(GENCO-III)	2016-17	14.77	12.10	45	30.97	34.09	14.52						
	2017-18	0.93	13.00	42	1.95	31.82	0.86						
	2013-14	16.54	8.39	192	11.70	78.69	10.69						
GTPS Faisalabad	2014-15	22.04	69.66	141	2.55	57.79	1.71						
(GENCO-III)	2015-16	15.92	5.52	160	20.60	65.57	15.70						
	2016-17	13.10	5.80	160	16.11	65.57	12.27						
	2017-18	7.18	6.48	118	10.72	48.36	6.02						
TPS Nandipur	2015-16	63.22	4.12	479	31.41	112.71	35.40						
(GENCO-III)	2016-17	55.56	3.87	457	35.82	107.53	38.52						
/	2017-18	82.30	3.34	526	53.47	114.35	61.15						
	2013-14	30.46	19.44	34	52.45	68.00	59.45						
FBC Lakhra	2014-15	42.41	29.28	54	30.54	108.00	54.97						
(GENCO-IV)	2015-10	45.10 25.00	29.15	20	40.00	50.40 51 10	22.68						
Res .	2017-18	33.90	74.25	34	1.05	51.28	0.96						
1.1000	2017-10	5.50	17.25	52	1.07	51.20	0.50						

TABLE 16

Source: GENCOs

 Π

	Auxiliary Consumption and other Factors (KEL and their IPPS)											
Power	Voor	Auxiliary Co	onsumption	Maximum	Load Factor	Capacity	Utilization					
Station	rear	(GWh)	(%)	Load (MW)	(%)	Factor (%)*	Factor (%)*					
	2013-14	341.00	9.06	890	51.00	51.00	85.00					
	2014-15	360.00	9.17	915	n.p.	n.p.	72.60					
	2015-16	372.00	9.40	985	n.p.	n.p.	78.20					
182-1	2016-17	412.00	9.52	960	51.00	64.00	76.00					
	2017-18	431.00	9.05	1,005	54.00	73.00	80.00					
	2013-14	237.00	6.51	560	79.00	74.00	100.00					
	2014-15	251.00	6.42	548	n.p.	n.p.	97.90					
	2015-16	254.00	6.17	557	n.p.	n.p.	99.50					
162-11	2016-17	243.00	6.20	563	82.00	94.00	98.00					
	2017-18	242.00	6.45	571	75.00	85.00	100.00					
	2013-14	10.00	2.54	85	55.00	51.00	94.40					
Korangi Town GTPS-II	2014-15	11.00	2.53	85	n.p.	n.p.	94.40					
	2015-16	14.00	2.80	97	n.p.	n.p.	96.70					
	2016-17	14.00	3.60	97	48.00	50.00	91.00					
	2017-18	13.00	4.02	97	42.00	40.00	90.00					
	2013-14	6.00	5.31	85	58.00	15.00	94.40					
	2014-15	8.00	5.00	85	n.p.	n.p.	94.40					
Site GTPS-II	2015-16	12.00	3.14	88	n.p.	n.p.	97.80					
	2016-17	13.00	3.39	97	57.00	49.00	91.00					
	2017-18	16.00	3.21	97	60.00	59.00	90.00					
	2013-14	64.00	8.01	196	66.00	41.00	89.00					
	2014-15	74.00	8.30	222	n.p.	n.p.	89.90					
Korangi CCPP	2015-16	108.00	7.92	239	n.p.	n.p.	96.70					
-	2016-17	91.00	8.10	233	64.00	69.00	94.00					
	2017-18	79.00	7.89	230	56.00	54.00	93.00					
Gul Ahmed	2016-17	22.92	1.99	128	97.06	70.89	88.71					
Energy	2017-18	21.10	1.83	128	97.50	64.87	84.94					
	2016-17	12.37	1.64	124	69.84	70.02	66.94					
Tapal Energy	2017-18	13.07	1.71	124	70.75	70.14	68.46					

 TABLE 17

 xiliary Consumption and other Factors (KEL and their IPI

* Calculations for capacity and utilization factors differ from PEPCO's calculations. Source: KEL/IPPs

	Auxiliary Consumption and other Factors (IPPs)											
Power	Veer	Auxiliary Consumption		Maximum	Load Factor	Capacity	Utilization					
Station	fear	(GWh)	(%)	Load (MW)	(%)	Factor (%)	Factor (%)					
Lal Pir Power	2013-14	151.37	6.78	350	79.79	67.87	67.87					
	2014-15	123.67	6.92	350	75.66	65.11	65.11					
	2015-16	128.27	6.59	350	70.78	60.11	59.30					
	2016-17	107.17	6.69	350	63.27	49.40	n.p.					
	2017-18	76.29	6.55	350	58.61	35.52	n.p.					
	2013-14	141.82	6.53	350	80.90	66.25	66.25					
Dale Can	2014-15	95.12	7.22	350	75.14	59.87	59.87					
Pak Gen.	2015-16	54.11	6.16	350	66.72	27.25	26.88					
Power	2016-17	111.56	6.46	350	63.92	53.43	n.p.					
	2017-18	86.89	6.56	350	58.95	40.35	n.p.					

TABLE 18 Auxiliary Consumption and other Factors (IPPs)

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Power	Maria	Auxiliary Co	nsumption	Maximum	Load Factor	Capacity	Utilization
Station	Year	(GWh)	(%)	Load (MW)	(%)	Factor (%)	Factor (%)
	2013-14	10.94	5.06	30	94.50	96.10	94.94
Altorn	2014-15	9.04	4.96	30	97.35	96.33	95.04
Energy	2015-16	9.58	5.19	30	94.80	96.40	94.81
Energy	2016-17	10.46	5.27	30	95.30	96.70	94.70
	2017-18	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
	2013-14	36.03	3.16	157	94.87	89.85	94.99
F. "	2014-15	31.40	2.07	157	94.54	75.91	83.59
Fauji	2015-16	30.41	2.67	157	95.60	84.70	88.72
NdDirwald	2016-17	29.72	2.65	155	94.30	83.80	89.71
	2017-18	31.42	3.00	156	92.09	78.16	87.14
	2013-14	15.66	2.32	128	70.56	59.56	76.98
11.1.1.1.1.1.1.1.	2014-15	17.88	2.40	126	76.49	63.52	86.76
Habibullah	2015-16	14.41	2.56	124	65.49	63.34	76.00
Coastat	2016-17	19.69	2.51	125	82.19	79.41	84.51
	2017-18	17.81	1.97	126	81.71	79.72	99.42
	2013-14	416.21	5.00	1,200	67.40	78.30	86.30
	2014-15	398.00	5.84	1,200	65.00	76.00	83.00
HUBCO	2015-16	524.11	6.49	1,200	71.60	71.60	81.88
	2016-17	484.77	6.66	1,200	64.45	64.45	81.81
	2017-18	375.34	6.73	1,200	49.48	49.48	53.28
	2013-14	185.00	2.78	1,444	55.10	80.20	68.70
	2014-15	196.00	2.75	1,431	59.00	85.54	69.00
КАРСО	2015-16	174.00	2.60	1,521	56.00	81.90	68.20
	2016-17	189.00	2.50	1,520	62.40	84.30	74.00
	2017-18	171.00	2.30	1,579	63.30	86.00	73.60
	2013-14	27.00	2.91	124	94.36	81.89	85.20
K - h ¹	2014-15	26.35	2.92	124	93.80	80.73	84.80
Koninoor	2015-16	26.41	3.01	124	93.80	78.12	83.15
Energy	2016-17	24.68	3.02	124	92.60	72.93	78.10
	2017-18	20.45	3.07	124	91.87	59.42	64.31
	2013-14	48.10	1.71	457	82.13	98.99	81.75
	2014-15	44.88	1.78	450	72.04	91.70	78.90
Rousch	2015-16	53.16	1.79	461	85.67	97.26	88.09
Power	2016-17	46.93	1.91	451	83.75	88.86	94.25
	2017-18	49.99	1.93	454	76.81	74.90	85.46
	2013-14	9.05	6.53	134	46.40	11.76	11.76
Calva	2014-15	2.55	7.20	126	41.59	2.99	2.99
Saba	2015-16	4.52	6.41	126	61.54	5.99	5.99
Power	2016-17	34.39	6.74	134	48.30	43.29	43.29
	2017-18	30.75	6.17	134	48.21	42.51	42.51
	2013-14	18.27	1.90	219	53.93	51.07	93.24
	2014-15	24.83	2.00	216	67.44	65.91	91.76
INB Liberty	2015-16	25.32	1.67	288	80.51	79.68	96.56
Power	2016-17	25.15	1.72	224	79.48	76.76	93.32
	2017-18	19.66	1.85	221	58.66	56.00	89.38
	2013-14	67.73	1.57	591	89.37	90.99	99.09
11-6	2014-15	67.52	1.60	549	85.93	87.08	96.37
UCN	2015-16	69.10	1.61	548	87.50	88.38	93.95
Power	2016-17	70.57	1.57	548	91.77	93.26	97.30
	2017-18	71.30	1.57	551	92.05	93.56	96.84

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Power		Auxiliary Co	nsumption	Maximum	Load Factor	Capacity	Utilization
Station	Year	(GWh)	(%)	Load (MW)	(%)	Factor (%)	Factor (%)
	2013-14	28.86	2.27	157	98.48	91.49	100.41
	2014-15	27.88	2.31	157	98.00	89.00	100.00
Attock Gen.	2015-16	26.36	2.19	157	85.00	86.00	100.00
	2016-17	31.98	2.74	158	82.06	82.99	99.85
	2017-18	23.55	2.52	158	66.03	66.69	91.77
	2013-14	37.66	1.96	215	81.08	81.08	86.68
A - 1	2014-15	52.16	3.57	215	78.02	78.02	82.99
Atlas	2015-16	47.99	3.63	215	70.29	70.29	75.69
Power	2016-17	51.06	3.82	214	71.36	71.36	77.76
	2017-18	48.37	3.88	215	66.54	66.54	71.82
	2013-14	39.50	2.75	217	84.56	101.00	84.00
F D	2014-15	41.00	2.80	217	84.00	91.00	91.00
Engro Power	2015-16	36.08	2.95	219	67.56	96.98	70.32
Gen. Qadirpur	2016-17	47.00	3.00	220	96.00	96.00	100.00
	2017-18	46.00	3.00	220	91.00	93.00	98.00
	2013-14	23.61	3.16	216	43.20	38.95	41.31
Coif	2014-15	24.15	3.04	220	47.52	41.86	42.58
Salt	2015-16	31.67	2.83	224	66.08	58.99	60.39
Power	2016-17	28.95	3.10	220	52.45	48.87	50.36
	2017-18	22.95	2.65	224	50.50	45.98	46.98
	2013-14	18.36	3.40	219	33.93	31.38	31.38
Orient	2014-15	29.17	2.81	218	65.45	60.54	55.67
Drient	2015-16	30.59	2.65	218	60.65	62.02	73.95
FOwer	2016-17	26.79	2.84	221	48.69	50.70	63.92
	2017-18	22.47	2.67	219	43.86	45.16	56.05
	2013-14	39.39	2.62	195	95.30	83.57	95.30
Nichat	2014-15	38.88	2.68	195	90.13	80.47	90.13
Power	2015-16	35.13	2.69	195	80.83	72.41	80.83
FOWEI	2016-17	35.57	2.79	195	80.51	70.76	80.51
	2017-18	32.42	2.69	195	77.62	68.70	77.62
	2013-14	27.50	2.37	196	95.66	85.80	88.70
Nichat	2014-15	27.40	2.36	196	93.05	81.33	85.02
Chunian	2015-16	31.53	2.54	196	93.67	70.49	73.84
Chantan	2016-17	34.46	2.55	196	95.70	76.60	80.20
	2017-18	27.93	2.47	196	92.90	64.14	79.60
	2013-14	23.68	2.93	225	45.61	40.87	45.73
Sapphire	2014-15	29.83	2.91	222	54.36	51.88	53.00
Electric Power	2015-16	30.78	2.92	223	58.68	55.00	58.76
	2016-17	29.61	2.99	228	55.02	51.00	53.51
	2017-18	33.59	3.97	224	56.77	43.88	45.69
Halmore	2015-16	29.70	3.14	218	55.42	54.13	31.30
Power	2016-17	20.43	3.57	213	39.05	33.06	37.11
	2017-18	26.61	3.05	221	50.49	49.13	51.23
	2013-14	30.25	1.94	217	83.41	83.41	96.13
Narowal	2014-15	25.72	1.ŏ1 2 Ω/	215	/ 5.55 61 77	/ 5.55 61 77	00.7 70.81
Energy	2016-17	25.75	1 93	213	71.23	71 15	79.21
	2017-18	22.35	1.86	216	64.05	64.05	68.89
	2013-14	32.25	2.10	197	97.70	88.44	90.58
	2014-15	32.07	2.07	196	97.80	88.15	90.27
Liberty Power	2015-16	27.53	2.16	196	97.65	72.55	75.93
rech.	2016-17	29.60	2.16	196	98.64	77.97	80.80
	2017-18	25.55	2.13	196	96.50	68.42	71.02

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Power	Veer	Auxiliary Co	onsumption	Maximum	Load Factor	Capacity	Utilization
Station	rear	(GWh)	(%)	Load (MW)	(%)	Factor (%)	Factor (%)
	2013-14	49.55	3.64	200	97.68	92.57	90.12
Foundation Power	2014-15	48.75	3.69	197	96.31	89.97	87.59
	2015-16	32.45	2.67	198	87.00	83.14	81.45
	2016-17	36.10	2.46	195	85.97	89.38	88.11
	2017-18	34.93	2.45	198	94.48	94.10	99.37
	2014-15	1.57	2.24	11	76.10	60.54	60.54
Davis	2015-16	1.65	2.17	11	82.39	65.54	82.39
Energen.	2016-17	1.64	2.68	11	76.50	51.24	67.00
	2017-18	0.54	6.00	8	15.10	11.30	59.30
	2014-15	59.16	2.38	381	72.56	73.89	79.30
Uch-II	2015-16	94.30	3.90	381	69.82	71.38	77.41
Power	2016-17	63.62	2.27	375	83.04	84.62	87.46
	2017-18	60.88	2.17	375	79.13	80.71	87.34

Source: IPPs

 TABLE 19

 Heat Rate and Plant Efficiency Data (GENCOs)

		Heat Rate	(Btu/kWh)	Plant Effic	ciency (%)
Power Station	Year	On Gross Generation	On Net Export to NTDC	On Gross Generation	On Net Export to NTDC
	2013-14	10,534.00	11,580.00	32.00	29.00
	2014-15	10,679.00	12,051.00	31.96	28.32
IPS Jamshoro	2015-16	11,352.00	12,590.00	30.07	27.12
(GENCO-I)	2016-17	10,823.00	12,008.00	31.53	28.42
	2017-18	11,099.00	12,425.00	30.75	27.46
	2013-14	10,993.00	n.p.	31.00	n.p.
	2014-15	11,520.00	12,023.00	29.63	28.39
GTPS KOTI	2015-16	11,682.00	12,107.00	29.21	28.18
(GENCO-I)	2016-17	12,124.00	12,612.00	28.15	27.06
	2017-18	12,627.00	13,549.00	27.03	25.19
	2013-14	12,387.00	n.p.	28.00	n.p.
TPS Guddu	2014-15	13,455.00	n.p.	25.36	n.p.
(Units 1-4)	2015-16	13,726.00	n.p.	24.86	n.p.
(GENCO-II)	2016-17	12,357.00	13,297.00	27.62	25.67
	2017-18	12,196.00	13,395.00	27.98	25.48
	2013-14	9,939.00	12,648.00	34.00	27.00
TPS Guddu	2014-15	7,195.00	n.p.	47.43	n.p.
(Units 5-13)	2015-16	8,796.00	n.p.	38.80	n.p.
(GENCO-II)	2016-17	n.p.	n.p.	n.p.	n.p.
	2017-18	n.p.	n.p.	n.p.	n.p.
TPS Guddu	2015-16	7,404.00	7,558.00	46.10	45.16
(Units 14-16)	2016-17	6,848.00	7,008.00	49.84	48.70
(GENCO-II)	2017-18	7,070.00	7,205.00	48.27	47.37
T DC 0	2013-14	17,747.00	n.p.	19.00	n.p.
IPS Quetta	2014-15	n.p.	n.p.	n.p.	n.p.
(Isolated	2015-16	16,571.00	16,808.00	20.60	20.31
Generation)	2016-17	16,792.00	17,109.00	20.32	19.95
(GENCO-II)	2017-18	0.00	0.00	0.00	0.00
	2013-14	10,358.00	11,528.00	33.00	30.00
TPS	2014-15	10,467.00	13,723.00	32.61	24.87
Muzaffargarh	2015-16	11,494.14	12,738.54	29.69	26.79
(GENCO-III)	2016-17	10,378.41	11,465.99	32.88	29.76
	2017-18	10,584.33	11,780.40	32.24	28.97

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		Heat Rate	(Btu/kWh)	Plant Effic	ciency (%)
Power Station	Year	On Gross	On Net Export to	On Gross	On Net Export to
		Generation	NTDC	Generation	NTDC
CDC	2014-15	13,137.00	n.p.	25.98	n.p.
SPS Faisalahad	2015-16	12,751.04	14,377.28	26.77	23.74
(GENCO-III)	2016-17	12,574.45	14,305.59	27.14	23.86
(GENCO-III)	2017-18	11,442.72	13,152.91	29.83	25.95
GTPS	2013-14	12,113.00	n.p.	28.00	n.p.
	2014-15	11,431.00	n.p.	29.85	n.p.
Faisalabad	2015-16	11,588.03	12,264.72	29.45	28.00
(GENCO-III)	2016-17	11,320.61	12,018.19	30.15	28.40
	2017-18	11,412.37	12,202.53	29.91	27.96
	2015-16	9,106.00	9,498.00	37.48	35.93
	2016-17	8,280.00	8,614.00	41.22	39.62
(GENCO-III)	2017-18	7,505.00	7,764.00	45.47	43.95
	2013-14	13,389.00	18,770.00	25.00	18.00
FDC Lalle a	2014-15	13,537.00	19,202.00	25.21	17.77
	2015-16	13,623.54	19,228.02	25.05	17.75
(GENCO-IV)	2016-17	13,219.06	18,609.02	25.82	18.34
	2017-18	13,424.00	n.p.	25.42	n.p.

Source: GENCOs

TABLE 20 Heat Rate and Plant Efficiency Data (KEL and their IPPs)

		Heat Rate (Btu/k	Wh) - HHV	Plant Efficier	icy (%)
Power Station	Year	On Gross Generation (Gas/FO)	On Net Basis	On Gross Generation (Gas/FO)	On Net Basis
Bin Qasim	2016-17	10,675.00	11,799.00	31.96	28.92
TPS-I	2017-18	10,500.00	11,543.00	32.50	29.56
Bin Qasim	2016-17	8,130.00	8,668.00	41.97	39.37
TPS-II	2017-18	7,792.00	8,329.00	43.79	40.97
Korangi Town	2016-17	9,301.00	9,638.00	36.69	35.40
GTPS-II	2017-18	9,226.00	9,619.00	36.98	35.47
	2016-17	9,370.00	9,701.00	36.42	35.17
Sile GTPS-II	2017-18	8,977.00	9,281.00	38.01	36.77
Karangi CCDD	2016-17	8,108.00	8,821.00	42.08	38.68
Korangi CCPP	2017-18	7,721.00	8,382.00	44.19	40.71
Gul Ahmed	2016-17	8,847.26	9,149.22	38.56	37.29
Energy	2017-18	8,890.41	9,208.36	38.37	37.05
Tanal Energy	2016-17	8,383.00	8,522.57	40.70	40.04
Tapal Energy	2017-18	8,377.02	8,522.54	40.73	40.04

Source: KEL/IPPs

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Heat Rate (Btu/kWh) Plant Efficiency (%)									
Power	Year	On Gross	On Net Export	On Gross	On Net Export				
Station		Generation	to NTDC	Generation	to NTDC				
	2013-14	8,599,74	9,225.29	39.68	36.99				
	2014-15	8.373.62	8,996,44	40.75	37.93				
Lal Pir	2015-16	8.653.83	9,264,47	39.43	36.83				
Power	2016-17	8,760.34	9.388.78	38.95	36.35				
	2017-18	8 945 63	9 572 25	38.15	35.65				
	2013-14	8 578 00	9 176 00	39.78	37.18				
	2013-14	8 391 67	9,170.00	10.66	37.10				
Pak Gen.	2014 15	8 694 26	9,044.05	20.00	36.83				
Power	2015 10	8 794 96	9,203.13	38.80	36.29				
	2010 17	8 933 10	9,402.24	38.20	35.69				
	2017-10	0,333.40	9,500.79	30.20	24.72				
	2013-14	9,322.95	9,020.75	30.00	34.73				
Altern	2014-15	9,570.00	10,069.00	35.70	33.90				
Energy	2015-10	9,407.00	9,921.70	30.27	34.39				
	2010-17	9,422.00	9,947.30	30.20	34.30				
	2017-18	7 400 00	7 700 00	45.00	44.20				
	2013-14	7,480.00	7,706.00	45.62	44.28				
Fauji	2014-15	7,458.00	7,728.00	45.57	44.15				
Kabirwala	2015-16	7,533.61	7,763.67	45.29	43.95				
	2016-17	7,613.45	7,821.97	44.82	43.62				
	2017-18	7,608.51	7,843.99	44.84	43.50				
	2013-14	8,336.50	8,531.00	40.94	40.00				
Habibullah	2014-15	8,371.60	8,579.00	40.77	39.70				
Coastal	2015-16	8,465.04	8,746.99	40.33	39.03				
	2016-17	8,039.25	8,410.80	42.47	40.59				
	2017-18	8,035.62	8,394.52	42.47	40.66				
	2013-14	n.p.	8,968.15	n.p.	38.05				
Hub	2014-15	n.p.	8,953.65	n.p.	38.00				
Power	2015-16	8,462.62	9,118.46	40.32	37.42				
rower	2016-17	8,466.82	9,053.14	40.30	37.69				
	2017-18	8,382.94	9,152.16	40.70	37.28				
	2013-14	7,590.00	7,807.00	45.00	43.70				
	2014-15	7,916.00	8,075.00	45.48	44.60				
КАРСО	2015-16	7,977.00	8,189.00	45.10	44.00				
	2016-17	8,028.00	8,236.00	44.80	43.70				
	2017-18	7,997.00	8,181.00	45.00	44.00				
	2013-14	7,228.08	7,444.67	47.21	45.83				
Kabinaar	2014-15	7,753.80	7,986.80	44.01	42.72				
Eporqu	2015-16	7,745.98	7,986.85	44.05	42.72				
Energy	2016-17	7,745.53	7,986.85	44.05	42.72				
	2017-18	7,741.54	7,986.85	44.08	42.72				
	2013-14	7,012.00	7,393.00	48.69	47.84				
Doursh	2014-15	7,027.00	7,153.00	48.59	47.73				
Rousen	2015-16	7,100.91	7,227.99	48.10	47.25				
rower	2016-17	7,109.65	7,245.30	48.04	47.14				
	2017-18	7,166.19	7,304.41	47.66	46.76				
	2013-14	9,955.78	10,438.76	34.97	32.69				
Saba	2014-15	10,324.91	11,126.07	33.81	31.37				
Dowor	2015-16	9,754.00	10,422.00	34.98	32.47				
FOwer	2016-17	9,737.00	10,441.00	35.04	32.68				
	2017-18	9,680.00	10,317.00	35.25	33.07				

 TABLE 21

 Heat Rate and Plant Efficiency Data (IPPs)

National Electric Power Regulatory Authority

_		Heat Rate	(Btu/kWh)	Plant Efficiency (%)			
Power	Year	On Gross	On Net Export	On Gross	On Net Export		
Station		Generation	to NTDC	Generation	to NTDC		
	2013-14	7,564.89	7,711.39	45.10	44.25		
TNB	2014-15	7,643.73	7,799.58	44.64	43.75		
Liberty	2015-16	7,920.75	8,077.18	43.13	42.29		
Power	2016-17	7,956.73	8,118.30	42.88	42.03		
	2017-18	8,288.26	8,467.86	41.17	40.29		
	2013-14	7,563.00	7,683.00	50.11	49.24		
	2014-15	6,758.00	6,893.00	50.49	49.50		
Uch	2015-16	6,737.93	6,874.33	50.64	49.63		
Power	2016-17	6,754.82	6,891.14	50.51	49.51		
	2017-18	6,712.85	6,847.25	50.83	49.83		
	2013-14	7,406.00	7,582.00	46.08	45.00		
• · · · · ·	2014-15	7,403.00	7,582.00	46.10	45.00		
Attock	2015-16	7,412.00	7,582.00	46.05	45.00		
Gen.	2016-17	7,368.00	7,582.00	46.32	45.00		
	2017-18	7,386.00	7,582.00	46.21	45.00		
Atlas	2013-14	7,400.00	7,584.00	46.10	45.00		
Power	2014-15	7,400.00	7,584.00	46.10	45.00		
_	2013-14	n.p.	7,907.00	n.p.	45.53		
Engro	2014-15	n.p.	7,907.00	n.p.	45.53		
Power	2015-16	n.p.	7,710.00	n.p.	44.26		
Gen.	2016-17	7,260.00	7,625.00	47.00	45.00		
Qadırpur	2017-18	7,260.00	7,625.00	47.00	45.00		
	2013-14	7,383.00	7,582.00	46.18	45.00		
	2014-15	7,379.00	7,582.00	46.21	45.00		
Nishat	2015-16	7,378.00	7,582.00	46.21	45.00		
Power	2016-17	7,371.00	7,582.00	46.26	45.00		
	2017-18	7,378.00	7,582.00	46.21	45.00		
	2013-14	7,402.00	7,582.00	46.10	45.00		
NI ¹ also at	2014-15	7,403.00	7,582.00	46.10	45.00		
Nishat	2015-16	n.p.	7,582.00	n.p.	45.00		
Chuntan	2016-17	n.p.	7,582.00	n.p.	45.00		
	2017-18	n.p.	7,582.00	n.p.	45.00		
Narowal	2015-16	n.p.	n.p.	n.p.	n.p.		
Eporav	2016-17	7,344.00	7,584.00	46.46	45.00		
Lifergy	2017-18	7,321.00	7,584.00	46.60	45.00		
	2013-14	7,417.70	7,582.54	46.00	45.00		
Liberty	2014-15	7,417.70	7,582.54	46.00	45.00		
Power	2015-16	7,417.70	7,582.54	46.00	45.00		
Tech.	2016-17	7,417.70	7,582.54	46.00	45.00		
	2017-18	7,417.70	75,822.53	46.00	45.00		
	2013-14	6,905.91	7,102.94	49.40	47.03		
Foundation	2014-15	6 919 00	7,210.38	49.00	47.51		
Power	2016-17	6 819 95	7,107.00	49.97	48.66		
	2017-18	6,834 21	7,006,00	49 91	48.69		
	2015-16	n.p.	n.p.	n.p.	n.p.		
Davis	2016-17	8,462.10	9,210.95	25.30	25.00		
Energen.	2017-18	9,426.00	9,685.00	28.90	28.10		
	2014-15	6,582.99	6,770.54	51.83	50.39		
Uch-II	2015-16	6,520.58	6,784.16	52.33	50.29		
Power	2016-17	6,554.25	6,739.34	52.06	50.63		
	2017-18	6,607.62	6,794.90	51.64	50.21		

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Dowor			Heat Rate (Btu/kWh)				Plant Efficiency (%)			
Power	Year	On Gross G	Seneration	On Net Expo	On Net Export to NTDC On		On Gross Generation		On Net Export to NTDC	
Station		Gas/FO	HSD	Gas/FO	HSD	Gas/FO	HSD	Gas/FO	HSD	
	2013-14	6,466.00	6,825.00	6,666.00	7,037.00	52.78	50.01	51.20	48.50	
Calif	2014-15	6,466.00	6,825.00	6,666.00	7,037.00	52.78	50.01	51.20	48.50	
Power	2015-16	6,466.00	6,825.00	6,666.00	7,037.00	52.78	50.01	51.20	48.50	
	2016-17	6,466.00	6,825.00	6,666.00	7,037.00	52.78	50.01	51.20	48.50	
	2017-18	6,466.00	6,825.00	6,666.00	7,037.00	52.78	50.01	51.20	48.50	
Orient	2013-14	6,504.00	6,866.00	6,666.00	7,037.00	52.48	49.71	51.20	48.50	
	2014-15	6,504.00	6,866.00	6,666.00	7,037.00	52.48	49.71	51.20	48.50	
	2015-16	6,504.00	6,866.00	6,666.00	7,037.00	52.48	49.71	51.20	48.50	
Power	2016-17	6,504.00	6,866.00	6,666.00	7,037.00	52.48	49.71	51.20	48.50	
	2017-18	6,504.00	6,866.00	6,666.00	7,037.00	52.48	49.71	51.20	48.50	
	2013-14	6,720.00	7,142.00	6,917.00	7,351.00	50.77	47.77	49.33	46.41	
Sapphire	2014-15	6,712.00	7,068.00	6,907.00	7,274.00	50.38	48.27	49.40	46.91	
Electric	2015-16	6,477.00	6,837.00	6,666.00	7,037.00	52.68	49.90	51.20	48.50	
Power	2016-17	6,472.00	6,833.00	6,666.00	7,037.00	52.72	49.94	51.20	48.50	
	2017-18	6,411.00	6,788.00	6,666.00	7,037.00	53.22	50.41	51.20	48.50	
	2015-16	6,499.00	6,861.00	6,666.00	7,037.00	52.52	49.74	n.p.	n.p.	
Haimore	2016-17	6,499.00	6,861.00	6,666.00	7,037.00	52.52	49.74	n.p.	n.p.	
Power	2017-18	6,479.00	6,840.00	6,666.00	7,037.00	52.68	49.90	n.p.	n.p.	

Source: IPPs

Main Electricity Statistics of the Country											
	2013-14	2014-15	2015-16	2016-17	2017-18						
1:Maximum Energy Demand (MW)											
PEPCO Area*	23,425	23,419	23,267	24,290	25,414						
KEL Area	2,929	3,056	3,195	3,270	3,527						
Un-diversified Energy Demand of the Country	23,505	24,022	26,394	26,782	27,874						
Diversified Energy Demand of the Country	23,044	23,551	25,876	23,733	26,741						
2:Auxiliary Consumption and System Losses	(in percentage)										
PEPCO Area											
Auxiliary Consumption	2.70	2.70	n.p.	n.p.	n.p.						
Transmission Losses	2.82	2.63	2.57	2.31	2.43						
Distribution Losses	18.83	18.99	18.14	17.93	18.32						
KEL Area											
Auxiliary Consumption (KEL Own)	7.56	7.55	7.36	7.62	7.55						
T&D Losses (excl. Auxiliary Consumption)	25.30	23.70	22.24	21.70	20.43						
3:Average Sales Price (Rs./kWh)				_							
PEPCO Area	10.35	10.60	7.61	8.84	n.p.						
KEL Area	12.15	12.07	12.97	12.84	12.72						
4:Per Capita Electricity Consumption											
PEPCO system											
Population (Million)	174.09	177.54	180.99	184.44	186.05						
Energy Sale (GWh)	76,493.93	77,636.48	81,489.76	86,634.70	97,030.13						
Per Capita Electricity Consumption (kWh)	445	446	457	475	522						
Average Sale/ Consumer (kWh)	3,145.62	3,070.23	3,117.50	3,189.36	3,404.22						
KEL system			t-total								
Population (Million)	15.07	15.39	15.72	16.05	16.39						
Energy Sale (GWh)	11,454.00	12,293.00	12,864.00	12,981.00	13,860.00						
Per Capita Electricity Consumption (kWh)	487	523	547	871	930						
Average Sale/ Consumer (kWh)	5,425.00	5,695.71	5,777.22	5,350.79	5,364.95						

TABLE 22

* Based on un-diversified power demand indicated by DISCOs in Table 51. Source: NTDC/DISCOs/KEL

State of Industry Report 2018 = = = = = = =

10.5 LOAD PATTERN AND PEAK LOAD HOURS

The electrical load pattern in the country varies from season to season; during summer season there is an increase in the inductive load while in winter season increase in resistive load has been observed. The peak hour timing in the system is normally from 3 PM to 6 PM. The hourly load figures for a typical working and non-working day in summer and winter, during 2017, are given hereunder:

Hourly System Demand (MW) (January - December, 2017)												
Hours of the day	Maximum Demand (MW)		System D Typical da	emand for a ay in Summer	System Demand for a Typical Day in Winter							
	Summer Winter		Working day Non-working da		Working day Non-working							
	(10-08-2017)	(05-11-2017)	(18-07-2017)	(21-05-2017)	(11-12-2017)	(26-11-2017)						
1	22,793	12,038	21,389	18,876	10,292	10,978						
2	22,413	11,383	20,906	18,319	9,909	10,759						
3	21,358	10,927	21,095	17,528	9,810	10,811						
4	20,791	11,058	20,579	17,558	9,233	10,741						
5	20,708	11,100	20,488	17,463	10,018	11,100						
6	21,158	11,262	20,606	16,709	11,109	12,045						
7	21,531	11,535	20,948	16,687	12,152	12,599						
8	21,720	11,795	20,553	16,548	12,584	12,806						
9	22,242	12,499	20,914	16,762	12,889	13,528						
10	22,624	13,063	22,068	17,104	13,106	14,002						
11	22,978	13,926	21,910	17,447	12,959	14,018						
12	23,598	14,270	22,161	17,167	13,354	13,872						
13	23,931	14,427	22,188	17,909	13,369	13,462						
14	24,550	13,552	21,523	17,895	13,455	13,375						
15	24,888	14,179	22,433	18,040	13,262	13,062						
16	25,264	14,549	21,876	17,876	13,642	13,143						
17	24,560	14,443	21,293	17,788	13,554	13,507						
18	24,038	15,645	20,511	16,897	14,097	14,813						
19	23,497	15,346	19,696	16,624	13,664	14,651						
20	23,914	14,464	20,192	17,842	13,369	13,911						
21	24,209	13,867	20,583	17,998	12,842	13,126						
22	24,205	13,109	20,442	18,119	12,239	12,312						
23	23,766	12,810	20,386	17,790	11,356	11,815						
24	23,430	12,288	20,067	17,602	11,000	11,860						

TABLE 23										
Hourly System Demand (MW) (January	/ - December, 2017)									

* Highlighted area indicates maximum demand of the day.

Source: National Power Control Centre, Islamabad

= = = = = = State of Industry Report 2018





10.6 ENERGY SALES AND CONSUMER-WISE ELECTRICITY CONSUMPTION

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The following tables (table 24 to 25) show the energy sales and consumer-wise electricity consumption of the country from 2013-14 to 2017-18:

IABLE 24											
Category-wise Energy Sales in PEPCO and K-Electric System											
		2013-14	2014-15	2015-16	2016-17	2017-18					
PEPCO System											
Domestic	GWh	33,322.30	34,177.90	36,941.29	41,418.48	46,113.72					
Percentage share	%	43.56	44.02	45.33	47.81	47.53					
Commercial	GWh	4,792.50	4,837.89	5,411.43	6,114.63	6,753.33					
Percentage share	%	6.27	6.23	6.64	7.06	6.96					
Industrial	GWh	20,550.80	21,073.32	21,147.75	20,066.60	23,274.17					
Percentage share	%	26.87	27.14	25.95	23.16	23.99					
Agricultural	GWh	8,129.49	7,849.97	8,362.27	9,063.16	9,977.62					
Percentage share	%	10.63	10.11	10.26	10.46	10.28					
Public Lighting	GWh	389.90	391.31	294.64	298.30	318.95					
Percentage share	%	0.51	0.50	0.36	0.34	0.33					
Bulk Supply	GWh	3,836.55	3,846.07	3,138.90	3,445.82	5,014.16					
Percentage share	%	5.02	4.95	3.85	3.98	5.17					

		2013-14	2014-15	2015-16	2016-17	2017-18
Others	GWh	31.40	33.02	1,134.49	1,150.71	450.18
Percentage share	%	0.04	0.04	1.39	1.33	0.46
Supplied to KEL	GWh	5,441.00	5,427.00	5,059.00	5,077.00	5,128.00
Percentage share	%	7.11	6.99	6.21	5.86	5.28
Total in PEPCO area	GWh	76,493.93	77,636.48	81,489.76	86,634.70	97,030.13
Percentage share	%	86.98	86.33	86.37	86.97	87.50
		K	EL System			
Domestic	GWh	5,489.00	6,150.00	6,596.00	6,643.00	7,170.00
Percentage share	%	47.92	50.03	51.27	51.17	51.73
Commercial	GWh	1,507.00	1,600.00	1,685.00	1,655.00	1,758.00
Percentage share	%	13.16	13.02	13.10	12.75	12.68
Industrial	GWh	3,568.00	3,844.00	3,830.00	3,885.00	4,124.00
Percentage share	%	31.15	31.27	29.77	29.93	29.75
Agricultural	GWh	160.00	166.00	163.00	159.00	151.00
Percentage share	%	1.40	1.35	1.27	1.22	1.09
Public Lighting	GWh	106.00	110.00	163.00	187.00	157.00
Percentage share	%	0.93	0.89	1.27	1.44	1.13
Bulk Supply	GWh	427.00	410.00	412.00	433.00	471.00
Percentage share	%	3.73	3.34	3.20	3.34	3.40
Others	GWh	197.00	13.00	15.00	19.00	29.00
Percentage share	%	1.72	0.11	0.12	0.15	0.21
Total in KEL area	GWh	11,454.00	12,293.00	12,864.00	12,981.00	13,860.00
Percentage share	%	13.02	13.67	13.63	13.03	12.50
			Country			
Domestic	GWh	38,811.30	40,327.90	43,537.29	48,061.48	53,283.72
Percentage share	%	44.13	44.84	46.14	48.25	48.05
Commercial	GWh	6,299.50	6,437.89	7,096.43	7,769.63	8,511.33
Percentage share	%	7.16	7.16	7.52	7.80	7.68
Industrial	GWh	24,118.80	24,917.32	24,977.75	23,951.60	27,398.17
Percentage share	%	27.42	27.71	26.47	24.04	24.71
Agricultural	GWh	8,289.49	8,015.97	8,525.27	9,222.16	10,128.62
Percentage share	%	9.43	8.91	9.04	9.26	9.13
Public Lighting	GWh	495.90	501.31	457.64	485.30	475.95
Percentage share	%	0.56	0.56	0.49	0.49	0.43
Bulk Supply	GWh	4,263.55	4,256.07	3,550.90	3,878.82	5,485.16
Percentage share	%	4.85	4.73	3.76	3.89	4.95
Others	GWh	228.40	46.02	1,149.49	1,169.71	479.18
Percentage share	%	0.26	0.05	1.22	1.17	0.43
Supplied to KEL by PEPCO	GWh	5,441.00	5,427.00	5,059.00	5,077.00	5,128.00
Percentage share	%	6.19	6.03	5.36	5.10	4.62
Total in the Country	GWh	87,947.93	89,929.4 <mark>8</mark>	94,353.76	99,615.70	110,890.13
Percentage share	%	100.00	100.00	100.00	100.00	100.00

Source: DISCOs/KEL

	Category-wise Con	sumers and th	eir Electricity	Consumptio	n (%)	
		2013-14	2014-15	2015-16	2016-17	2017-18
	PEPCO Area (Consur	ners and Consur	mption in perce	entage to the t	otal)	
Domostic	Consumers	85.54	85.67	85.82	86.00	85.94
Domestic	Consumption	43.56	44.02	45.33	47.81	47.53
Commercial	Consumers	11.67	11.58	11.48	11.36	11.22
Commercial	Consumption	6.27	6.23	6.64	7.06	6.96
Inductrial	Consumers	1.35	1.34	1.33	1.31	1.26
industriat	Consumption	26.87	27.14	25.95	23.16	23.99
Agricultural	Consumers	1.37	1.35	1.31	1.27	1.17
Agricultural	Consumption	10.63	10.11	10.26	10.46	10.28
Dublic Lighting	Consumers	0.04	0.04	0.04	0.04	0.04
Public Lighting	Consumption	0.51	0.50	0.36	0.34	0.33
Dully Consulty	Consumers	0.02	0.02	0.02	0.02	0.02
вик Supply	Consumption	5.02	4.95	3.85	3.98	5.17
Others	Consumers	0.00	0.00	0.00	0.00	0.36
Others	Consumption	0.04	0.04	1.39	1.33	0.46
Supplied to KEL	Consumption	7.11	6.99	6.21	5.86	5.28
	KEL Area (Consume	ers and Consum	ption in percer	ntage to the to	tal)	
	Consumers	78.15	78.57	78.97	80.20	81.15
Domestic	Consumption	47.92	50.03	51.27	51.17	51.73
	Consumers	20.75	20.35	19.97	18.82	17.95
Commercial	Consumption	13.16	13.02	13.10	12.75	12.68
	Consumers	0.97	0.96	0.93	0.86	0.80
Industrial	Consumption	31.15	31.27	29.77	29.93	29.75
A 1 1/ 1	Consumers	0.11	0.12	0.12	0.11	0.09
Agricultural	Consumption	1.40	1.35	1.27	1.22	1.09
	Consumers	0.00	0.00	0.00	0.00	0.00
Public Lighting	Consumption	0.93	0.89	1.27	1.44	1.13
	Consumers	0.01	0.01	0.01	0.01	0.01
Bulk Supply	Consumption	3.73	3.34	3.20	3.34	3.40
	Consumers	0.00	0.00	0.00	0.00	0.00
Others	Consumption	1.72	0.11	0.12	0.15	0.21
	Country (Consume	rs and Consum	otion in percen	tage to the tot	al)	
	Consumers	84 91	85.07	85.25	85 50	85 52
Domestic	Consumption	44.13	44.84	46.14	48.25	48.05
	Consumers	12.44	12.32	12.19	12.01	11.80
Commercial	Consumption	7.16	7.16	7.52	7.80	7.68
	Consumers	1.32	1.31	1.30	1.27	1.22
Industrial	Consumption	27.42	27.71	26.47	24.04	24.71
	Consumers	1.27	1.25	1.21	1.16	1.08
Agricultural	Consumption	9.43	8.91	9.04	9.26	9.13
	Consumers	0.04	0.04	0.04	0.04	0.04
Public Lighting	Consumption	0.56	0.56	0.49	0.49	0.01
	Consumers	0.02	0.02	0.02	0.02	0.02
Bulk Supply	Consumption	<u>4 85</u>	<u> </u>	3 76	3 89	4 95
	Consumers	0.00	0.00	0.00	0.00	0.33
Others	Consumption	0.00	0.00	1 22	1 17	0.33
Supplied to KEL by	Consumption	6.19	6.03	5.36	5.10	4.62
PEPCO	Constaniption	0.15	0.00	5.50	5.10	1.52

TABLE 25
ategory-wise Consumers and their Electricity Consumption (%

Source: DISCOs/KEL

10.7 PATTERN OF ELECTRICITY CONSUMPTION

The overall electricity consumption in the country since 2000 was growing steadily. However, during the FY 2017-18 electricity consumption in the country excluding K-Electric area increased by 12.00%. The sectorwise electricity consumption and their share in total electricity consumption of the country, for the years 2013-14 to 2017-18 are given in the following table:

	Ar	nnual Growth Ra	te of Electricity	/ Consumption		
		2013-14	2014-15	2015-16	2016-17	2017-18
			PEPCO Area			
Domostic	GWh	33,322.30	34,177.90	36,941.29	41,418.48	46,113.72
Domestic	%	9.90	2.57	8.09	12.12	11.34
Commercial	GWh	4,792.50	4,837.89	5,411.43	6,114.63	6,753.33
Commercial	%	8.09	0.95	11.86	12.99	10.45
Inductrial	GWh	20,550.80	21,073.32	21,147.75	20,066.60	23,274.17
industriat	%	10.24	2.54	0.35	-5.11	15.98
Agricultural	GWh	8,129.49	7,849.97	8,362.27	9,063.16	9,977.62
Agricultural	%	7.67	-3.44	6.53	8.38	10.09
Public Lighting	GWh	389.90	391.31	294.64	298.30	318.95
Fublic Lighting	%	0.73	0.36	-24.70	1.24	6.92
Bulk Supply	GWh	3,836.55	3,846.07	3,138.90	3,445.82	5,014.16
вик зирріу	%	5.90	0.25	-18.39	9.78	45.51
Othors	GWh	31.40	33.02	1,134.49	1,150.71	450.18
Others	%	15.52	5.16	3336.18	1.43	-60.88
Supplied to KEL	GWh	5,441.00	5,427.00	5,059.00	5,077.00	5,128.00
Supplied to KEL	%	-0.40	-0.26	-6.78	0.36	1.00
Total	GWh	76,493.93	77,636.48	81,489.76	86,634.70	97,030.13
Percentage change	%	8.58	1.49	4.96	6.31	12.00
			KEL Area			
Domostic	GWh	5,489.00	6,150.00	6,596.00	6,643.00	7,170.00
Domestic	%	7.99	12.04	7.25	0.71	7.93
Commercial	GWh	1,507.00	1,600.00	1,685.00	1,655.00	1,758.00
Commercial	%	0.00	6.17	5.31	-1.78	6.22
Inductrial	GWh	3,568.00	3,844.00	3,830.00	3,885.00	4,124.00
industriat	%	3.57	7.74	-0.36	1.44	6.15
Agricultural	GWh	160.00	166.00	163.00	159.00	151.00
Agricultural	%	7.38	3.75	-1.81	-2.45	-5.03
Dublic Lighting	GWh	106.00	110.00	163.00	187.00	157.00
Public Lighting	%	-4.50	3.77	48.18	14.72	-16.04
Bull Cumply	GWh	427.00	410.00	412.00	433.00	471.00
вик зирріу	%	-9.73	-3.98	0.49	5.10	8.78
Othors	GWh	197.00	13.00	15.00	19.00	29.00
Others	%	13.22	-93.40	15.38	26.67	52.63
Total	GWh	11,454.00	12,293.00	12,864.00	12,981.00	13,860.00
Percentage change	%	4.68	7.32	4.64	0.91	6.77
			Country			
Domostic	GWh	38,811.30	40,327.90	43,537.29	48,061.48	53,283.72
Domestic	%	9.62	3.91	7.96	10.39	10.87
Commercial	GWh	6,299.50	6,437.89	7,096.43	7,769.63	8,511.33
Commercial	%	6.04	2.20	10.23	9.49	9.55
Inductrial	GWh	24,118.80	24,917.32	24,977.75	23,951.60	27,398.17
muustriat	%	9.20	3.31	0.24	-4.11	14.39
Agricultural	GWh	8,289.49	8,015.97	8,525.27	9,222.16	10,128.62
Agricultural	%	7.66	-3.30	6.35	8.17	9.83

TABLE 26 nnual Growth Rate of Electricity Consumption

		2013-14	2014-15	2015-16	2016-17	2017-18
Public Lighting	GWh	495.90	501.31	457.64	485.30	475.95
Public Lighting	%	-0.44	1.09	-8.71	6.04	-1.93
Pulk Cupply	GWh	4,263.55	4,256.07	3,550.90	3,878.82	5,485.16
вик зирріу	%	4.09	-0.18	-16.57	9.23	41.41
Othors	GWh	228.40	46.02	1,149.49	1,169.71	479.18
Others	%	13.53	-79.85	2398.02	1.76	-59.03
Supplied to KEL by	GWh	5,441.00	5,427.00	5,059.00	5,077.00	5,128.00
PEPCO	%	-0.40	-0.26	-6.78	0.36	1.00
Total	GWh	87,947.93	89,929.48	94,353.76	99,615.70	110,890.13
Percentage change	%	8.06	2.25	4.92	5.58	11.32

Source: NTDC/KEL

10.8 SURPLUS/DEFICIT IN DEMAND AND SUPPLY DURING PEAK HOURS (ACTUAL AND PROJECTED)

The actual position of demand and supply of the electric power during peak hours in the NTDC's and K-Electric's systems have been reproduced in the following tables (table 27-28). Further, the projected figures of planned generation capacity, demand growth rate and surplus/deficit of electric power for the years to come, in the NTDC and K-Electric areas have also been collected through respective companies and are included in these tables:

A: Actual Figures									
Financial Year ending 30 th June	Generation Capability (MW)	Demand D System Pea	uring NTDC's Ik Hours (MW)	Surplus/ (Deficit) (MW)					
2014	16,170	20	0,576	-4,406					
2015	16,500	2.	1,701	-5,201					
2016	17,261	22	2,559	-5,298					
2017	19,020	2:	5,117	-6,097					
2018	23,766	20	5,031	-2,265					
B: Projected Figures									
Financial Year ending 30 th June	Planned Generation Capability as per NTDC (MW)	NTDC Projected Demand Growth Rate (%)	NTDC's Projected Demand during Peak Hours (MW)	Surplus/ (Deficit) (MW)					
2019	26,887	3.9	27,261	-374					
2020	28,892	4.1	28,155	737					
2021	31,184	3.8	29,325	1,859					
2022	35,883	3.9	30,921	4,962					
2023	37,786	3.9	31,953	5,833					
2024	39,196	3.8	33,696	5,500					
2025	37 935	3.9	35.422	2.513					

 TABLE 27

 Surplus/Deficit in Demand and Supply during NTDC's System Peak Hours

Source: NTDC

TABLE 28

Surplus/Deficit in Demand and Supply during K-Electric's System Peak Hours

A: Actual Figures			
Financial Year ending 30 th June	Generation Capability (MW)*	Demand During KEL's System Peak Hours (MW)	Surplus/ (Deficit) (MW)
2014	2,601	2,929	-328
2015	2,632	3,056	-424
2016	2,860	3,195	-335
2017	2,920	3,270	-350
2018	3,027	3,527	-500

B: Projected Figures				
Financial Year ending 30 th June	Planned Generation Capability as per KEL (MW)	KEL's Projected Demand Growth Rate (%)	KEL's Projected Demand during Peak hours (MW)	Surplus/ (Deficit) (MW)
2019	3,147	8.80	3,836	-689
2020	3,361	6.50	4,087	-726
2021	4,638	7.10	4,376	262
2022	5,356	6.70	4,668	688
2023	5,356	6.10	4,952	404

* Including own generation/import from all sources. Source: KEL

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ELECTRICITY GENERATION

11.1 GENERAL

Pakistan is facing chronic electricity shortages due to demand growth, high system losses, seasonal reductions in the availability of hydropower and circular debt etc. Rotating power outages ("load shedding") are common and many villages are not yet electrified.

The power sector of Pakistan is a mix of thermal, hydro, nuclear and renewable energy power plants. Originally the ratio of hydel to thermal installed generation capacity, in the country was about 67% to 33% (1985) but with the passage of time, due to different reasons more of thermal generation was added thereby reducing the share of hydel generation. At present, ratio of hydel to thermal installed generation capacity is about 25% to 65%. The dilemma for Pakistan is that its power production is dominated by thermal power plants running on oil and gas.

11.2 THERMAL POWER GENERATION

Majority of Pakistan's power generation is thermal, with furnace oil, natural gas and high-speed diesel as fuels; coal is almost non-existent yet. However, most of the upcoming power projects in the country would be based on coal and gas. The import of oil contributes as one of the major reason for current account deficit. Any strategy to cut current account deficit would require a cut down in the oil imports and for this it is essential to reduce the electricity generation through oil.

11.3 THERMAL POWER GENERATION AND FUEL CONSUMPTION

Gas: During the year 2017-18, the share of electricity generated using gas in the total electricity generation of the country was 32.25% while this share during 2016-17 was 48.58%.

RLNG: During the year 2017-18, the share of electricity generated using RLNG in the total electricity generation of the country was 22.99% while this share during 2016-17 was 0.83%.

Residual Furnace Oil: During the year 2017-18, the share of electricity generated using furnace oil in the total electricity generation of the country was 30.63% while this share during 2016-17 was 47.08%.

Coal: During the year 2017-18, the share of electricity generated using coal in the total electricity generation of the country was 13.27% while this share during 2016-17 was 1.34%.

High Speed Diesel: During the year 2017-18, the share of electricity generated using high speed diesel in the total electricity generation of the country was 0.86% while this share during 2016-17 was 2.16%.

The historical record of thermal electricity generation using different fuels, from the years 2013-14 to 2017-18 is given in the following table:

		TABLE 29				
	Thermal Elect	ricity Generation by S	Sector and b	y Fuel (GWh)	
		2013-14	2014-15	2015-16	2016-17	2017-18*
Thermal Genera	tion by:					
GENCOs (I, II, III and IV)		13,016.64	13,300.55	16,391.91	18,709.99	16,199.10
KEL Own Power Plants		8,709.00	9,319.00	10,323.00	10,147.00	10,338.00
IDDc	PEPCO Area	43,692.67	44,369.02	45,146.42	47,972.10	62,436.23
IFFS	KEL Area	1,380.00	1,525.00	1,421.00	1,531.00	1,900.09
Others (SPPs/	PEPCO Area	1,108.00	1,015.00	251.00	271.40	665.53
CPPs/N-CPPs)	KEL Area	168.00	191.00	139.00	187.00	550.00
Total Thermal G	eneration	68,074.31	69,719.57	73,672.33	78,818.49	92,088.94

			2013-14	2014-15	2015-16	2016-17	2017-18*
Therm	al Generat	tion using:					
	PEPCO	Generation on Gas (GWh)	23,877.00	23,921.94	29,497.42	31,520.24	23,291.97
	Area**	Share of Gas Generation (%)	35.07	34.31	40.04	39.99	25.29
Car	KEL	Generation on Gas (GWh)	6,892.00	7,293.00	8,065.00	6,768.50	6,403.50
Gas	Area [‡]	Share of Gas Generation (%)	10.12	10.46	10.95	8.59	6.95
	Tatal	Generation on Gas (GWh)	30,769.00	31,214.94	37,562.42	38,288.74	29,695.47
	Total	Share of Gas Generation (%)	45.20	44.77	50.99	48.58	32.25
	PEPCO	Generation on RLNG (GWh)	0.00	0.00	0.00	657.88	20,678.32
	Area	Share of RLNG Generation (%)	0.00	0.00	0.00	0.83	22.45
	KEL	Generation on RLNG (GWh)	0.00	0.00	0.00	0.00	495.00
KLING	Area	Share of RLNG Generation (%)	0.00	0.00	0.00	0.00	0.54
	Total	Generation on RLNG (GWh)	0.00	0.00	0.00	657.88	21,173.32
	TOLAL	Share of RLNG Generation (%)	0.00	0.00	0.00	0.83	22.99
	PEPCO	Generation on RFO (GWh)	32,203.08	31,474.07	30,631.47	32,073.70	22,755.88
	Area	Share of RFO Generation (%)	47.31	45.14	41.58	40.69	24.71
REO	KEL	Generation on RFO (GWh)	3,365.00	3,742.00	3,818.00	5,034.50	5,451.59
N O	Area ^{##}	Share of RFO Generation (%)	4.94	5.37	5.18	6.39	5.92
	Total	Generation on RFO (GWh)	35,568.08	35,216.07	34,449.47	37,108.20	28,207.47
	Totat	Share of RFO Generation (%)	52.25	50.51	46.76	47.08	30.63
	PEPCO	Generation on HSD (GWh)	1,625.23	3,186.29	1,512.28	1,704.54	788.18
	Area	Share of HSD Generation (%)	2.39	4.57	2.05	2.16	0.86
HSD	KEL	Generation on HSD (GWh)	0.00	0.00	0.00	0.00	0.00
1150	Area	Share of HSD Generation (%)	0.00	0.00	0.00	0.00	0.00
	Total	Generation on HSD (GWh)	1,625.23	3,186.29	1,512.28	1,704.54	788.18
	····	Share of HSD Generation (%)	2.39	4.57	2.05	2.16	0.86
	PEPCO	Generation on Coal (GWh)	112.00	102.27	148.16	997.14	11,786.50
	Area	Share of Coal Generation (%)	0.16	0.15	0.20	1.27	12.80
Coal	KEL	Generation on Coal (GWh)	0.00	0.00	0.00	62.00	438.00
cour	Area	Share of Coal Generation (%)	0.00	0.00	0.00	5.85	3.58
	Total	Generation on Coal (GWh)	112.00	102.27	148.16	1,059.14	12,224.50
	. otat	Share of Coal Generation (%)	0.16	0.15	0.20	1.34	13.27
Total 1	Thermal G	eneration	68.074.31	69.719.57	73.672.33	78.818.49	92.088.94

Total Thermal Generation

* Net Electricity Generation during FY 2017-18 . [†] Including generation of IPPs in KEL system. Source: GENCOs/IPPs/KEL ** Including generation of SPPs/CPPs/N-CPPs in PEPCO system. [#] Including generation of IPPs/CPPs in KEL system.

11.4 HYDEL POWER GENERATION

Pakistan has a potential of around 40,000 MW hydropower, whereas the installed hydel power capacity of Pakistan at the end of FY 2017-18 was 8,713 MW. The share of existing hydel power installed capacity to the total installed generation capacity of the country is only 24.22% while this share in year 1985 was around 67%. The share of hydel power generation during FY 2017-18, in the energy mix of Pakistan, was 21.00% as against 26.59% during same period last year. Most of the installed hydel power capacity of the country is owned by public sector (WAPDA) and only 372 MW of installed hydel power capacity is in private sector.

As discussed earlier, the availability of hydel power generation is subject to seasonal variation i.e. it depends upon the reservoir levels, inflow of water and discharge of water from the reservoir. Monthly variation in maximum hydropower generation capability, during past five years, as provided by NPCC is given in the following table:

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			Month	y variati	on in Ma		ydel Ge	nerating	Capabi	y (141 v	V)		-
Mon th	Year	Tarbela	Mangla	Ghazi Barotha	Warsak	Chashma Hydel	Jinnah Hydel	Allai Khwar	Khan Khwar	Duber Khwar	Small Hydels	Others	Total
	2013	3,605	1,115	1,450	190	160	39	121	0	0	127	0	6,807
	2014	3,522	1,115	1,450	180	120	n.p.	n.p.	n.p.	n.p.	80	0	6,467
lul	2015	3,352	1,085	981	144	80	13	95	35	127	65	0	5,977
	2016	3,252	423	989	168	83	29	67	27	125	60	0	5,223
	2017	3,449	274	1,450	214	130	44	121	72	130	73	0	5,957
	2013	3,578	1,115	1,450	191	160	32	121	0	0	128	0	6,775
ust	2014	3,605	1,115	1,450	175	184	n.p.	n.p.	n.p.	n.p.	78	0	6,607
ıßn	2015	3,547	777	972	156	53	16	82	0	121	66	0	5,790
∢	2016	3,386	638	998	1/5	132	28	52	28	118	6/	0	5,622
	2017	3,478	1,105	1,450	213	121	24	140	/2	130	69	0	6,802
er	2013	3,613	1,115	1,450	190	184	70	121	0	0	114	0	6,857
qu	2014	3,605	1,115	1,450	150	184	n.p.	n.p.	n.p.	n.p.	81	0	6,585
otei	2015	3,197	943	1,019	141	143	40	40	17	64 70	64	0	5,652
Sep	2016	3,191	1,109	1,002	133	142	30	38	1/	13	05	0	5,800
	2017	3,453	1,115	1,450	214	124	32	121	121	130	/1	0	6,664
5	2013	3,397	1,115	1,450	160	104	/3	121	121	0	60	0	6,681
be	2014	3,005	1,000	1,450	150	101	n.p.	n.p. 11	n.p.	n.p. 40	02 E6	0	0,400
Cto	2015	1,150	781	000	91	110	24	21	10	40	50	0	2,212
0	2010	2 /52	1 1 1 1 5	1 450	177	127	J4 15	121	72	50	71	0	6748
	2017	2,455	1,115	1,430	177	173	4J 60	121	68	0	40	0	5 5 2 2
Der	2013	2,004	1,115	1,100	150	168	00	121	00	 	80	0	5,332
цц Ц	2014	2,000	987	650	105	100	11.p. 15	70	n.p. 0	57	67	0	3,771
эле	2015	1 593	978	995	48	132	45	15	6	18	37	0	3,101
ž	2017	2 508	1 115	1 160	142	152	46	121	72	65	51	0	5,007
	2013	2 584	1,115	1,100	130	184	58	121	72	0	51	0	5,475
oer	2013	2,268	1,115	1,160	148	140	n_	n p	n n	np	61	0	4.892
ämk	2015	828	650	561	85	98	36	29	0 0	19	47	0	2,353
ece	2016	771	537	619	61	86	35	11	5	3	33	0	2,161
	2017	2.144	822	1.450	178	130	44	100	72	130	45	0	5,115
	2014	1.604	880	1,160	140	120	36	121	68	0	34	0	4.163
≥	2015	1,100	1.018	960	142	126	n.p.	n.p.	n.p.	n.p.	25	0	3,371
Ina	2016	442	147	296	80	67	6	12	0	20	13	0	1,083
Jar	2017	208	106	163	73	51	7	7	11	12	19	0	657
	2018	320	192	0	40	79	12	0	0	0	15	0	658
	2014	2,000	1,013	1,350	140	161	60	121	68	0	45	0	4,958
ary	2015	2,049	977	1,450	141	158	n.p.	n.p.	n.p.	n.p.	77	0	4,852
nu	2016	1,075	1,005	721	72	96	36	15	0	21	29	0	3,070
Fek	2017	741	470	598	84	89	28	40	29	27	37	0	2,143
	2018	1,774	634	1,375	240	117	36	121	72	65	35	0	4,469
	2014	1,879	751	1,160	129	149	67	121	68	130	60	0	4,514
÷	2015	1,355	803	1,160	140	150	n.p.	n.p.	n.p.	n.p.	73	0	3,681
lard	2016	746	684	533	97	103	43	89	0	57	62	0	2,414
2	2017	511	327	466	72	71	31	54	32	41	51	0	1,656
	2018	1,061	311	1,160	142	91	48	61	72	65	48	0	3,059
	2014	1,698	1,002	1,450	165	184	70	121	68	130	78	0	4,966
Li I	2015	1,395	1,000	1,350	140	183	n.p.	n.p.	n.p.	n.p.	78	0	4,146
Apı	2016	1,198	785	719	76	115	42	104	0	109	59	0	3,207
	2017	/41	689	646	138	104	44	103	40	103	/0	0	2,678
	2018	1,945	638	1,450	221	122	46	121	72	130	65	0	4,810
	2014	2,200	1,107	1,450	201	184	67	121	68	128	87	0	5,613
ž	2015	3,290	1,115	1,450	185	181	n.p.	n.p.	n.p.	n.p.	93	0	6,314
Σ	2016	2,434	664	1,033	/6	133	42	70	0	128	69	0	4,693
	2017	1,914	796	1,037	154	104	49	121	38	120	65	0	4,350
	2018	2,020	638	1,450	280	122	44	121	130	130	70	487	5,492

Mon th	Year	Tarbela	Mangla	Ghazi Barotha	Warsak	Chashma Hydel	Jinnah Hydel	Allai Khwar	Khan Khwar	Duber Khwar	Small Hydels	Others	Total
	2014	2,670	1,115	1,450	175	144	66	121	68	120	89	0	6,018
d)	2015	3,152	1,115	1,450	185	181	n.p.	n.p.	n.p.	n.p.	88	0	6,171
nne	2016	2,858	673	984	139	105	36	84	9	129	69	0	5,086
Ē	2017	2,681	485	1,016	157	100	42	58	29	129	65	0	4,762
	2018	3,054	721	1,450	218	127	52	121	72	130	72	487	6,504

Source: National Power Control Centre, Islamabad

11.5 NUCLEAR POWER GENERATION

Pakistan Atomic Energy Commission, interalia, undertakes the projects of nuclear power plants' development, operation and maintenance in the country. The 1st Nuclear Power Plant (NPP) of the country, namely Karachi Nuclear Power Plant (KANUPP), was commissioned in 1971 in Karachi through a turn-key agreement. The total installed capacity of this plant was 137 MW and the useful life of this plant was 30 years. However, after completion of 30 years life, the Pakistan Nuclear Regulatory Authority extended the operational life of this plant, by another 15 year at reduced capacity. The 2nd NPP of the country, namely the Chashma Nuclear Power Plant (CHASNUPP-I) was commissioned in year 2000 also through a turnkey agreement by China National Nuclear Corporation. The installed capacity of this plant is 325 MW. The 3rd NPP namely Chashma Nuclear Power Plant (CHASNUPP-II) was commissioned on May 18, 2011. The installed capacity of this plant is 325 MW. The 4th NPP namely Chashma Nuclear Power Plant (CHASNUPP-II) was commissioned on May 18, 2011. The installed capacity of 340 MW was commissioned on December 28, 2016. During the reported period, the 5th NPP namely Chashma Nuclear Power Plant (CHASNUPP-IV) having installed capacity of 340 MW has been commissioned on September 19, 2017.

11.6 RENEWABLE ENERGY GENERATION (WIND, SOLAR AND BAGASSE)

Pakistan, like other developing countries of the region, is facing a serious challenge of energy deficit. Hence, Pakistan is working to expand the use of renewable energy to help bridge the gap of energy deficiency in the country. The country is blessed with natural resources that can be utilized to create electricity.

Renewable resources that are technologically viable and have prospects to be exploited commercially in Pakistan include wind energy, geothermal, solar energy, tidal energy, micro/small-hydel, bio-energy and emerging technologies like fuel cell etc. Pakistan can benefit from these resources and can supplement existing energy resources as well as can use as primary energy source when no other option in available.

The Coastal Belt of Sindh is blessed with a wind corridor that is 60 km wide (Gharo-Kati Bandar) and 180 km long (up to Hyderabad). This corridor has the exploitable potential of 50,000 MW of electricity generation through wind energy. In addition to that there are other wind sites available in Coastal Area of Balochistan and some in Northern Areas. Technically the grid can take up to 30-40% of wind energy. Most of the remote villages in the south can be electrified through micro-wind turbines. At present, the share of renewable energy in the national grid of the country is non-existent as against a wind power potential of 63,000 MW in the country.

The Government of Pakistan established the Alternative Energy Development Board (AEDB) in 2003 to create an environment in the country that is conducive to investment from the private sector in renewable energy. Besides AEDB, the Irrigation and Power Departments of Punjab and Khyber Pakhtunkhwa are actively involved in development of small hydel power plants. The Provincial/AJ&K Organizations which are involved in development of small hydropower projects are as under:

- a) Pakhtunkhwa Energy Development Organization (PEDO)
- b) Punjab Power Development Board (PPDB)
- c) Irrigation and Power Development Board, Sindh
- d) AJK Hydro Electric Board (AJKHEB) and AJK Private Power Cell
- e) Northern Area Public Works Department

The details of the project undertaken by PEDO are included in this report.

TABLE 31
Ongoing Projects and Expansion Plan of Hydel Power Generation
in Khyber Pakhtunkhwa under E&P Department

S. No.	Name of Project	Capacity (MW)	Actual/Expected Commissioning Year	Project Cost (Rs. in Million)
Exist	ing/on-going Projects:			
1	Malakand-III Hydropower Project, Malakand	81.00	November, 2008	6,379.55
2	Pehur Hydropower Project, Swabi	18.00	March, 2010	900.00
3	Ranolia Hydropower Project, Kohistan	17.00	2016	5,247.00
4	Machai Hydropower Project, Mardan	2.60	2016	1,490.23
5	Daral Hydropower Project, Swat	36.60	2017	8,450.67
6	Koto Hydropower Project, Dir	40.80	February, 2019	13,998.89
7	Karora Hydropower Project, Shangla	11.80	July, 2019	4,620.06
8	Jabori Hydropower Project, Mansehra	10.20	2019	3,798.26
9	Construction of 356 Mini Micro Hydel Power Stations in Northern Districts of KPK	34.70	2019	5,298.42
10	Gorkin-Matiltan Hydropower Project, Swat	84.00	November, 2020	20,723.00
11	Lawi Hydropower Project, Chitral	69.00	November, 2021	20,087.00
Ехра	nsion Existing Projects:			
1	Access to Clean Energy Program	53.10	2021	12,087.06

Source: Pakhtunkhwa Energy Development Organization, Government of Khyber Pakhtunkhwa, Peshawar

11.7 INVESTMENT PLAN FOR POWER GENERATION PROJECTS

The investment plan for power generation projects along with other details, for the years to come, as provided by the NTDC and PPIB are produced in the following tables respectively. Further, the investment plan for power generation projects under K-Electric have also been kept separately.

	TABLE 32			
Investment Plan for Power Generation	n Projects (K-Ele	ectric Limited) (20	018-19 to 2021-2	22)
		Course alters	E	E

S. No.	Name of Project	Proposed Location	Capacity Addition/ (Deletion) (MW)	Expected Commissioning Year	Estimated Cost (US\$ Million)**
KEL's	s Own Programme				
1	Addition of BQPS-III 900 MW RLNG Plant (P-I)	Bin Qasim	450	2020-21	720.00*
2	Addition of BQPS-III 900 MW RLNG Plant (P-II)	Bin Qasim	450	2020-21	750.00*
Plan	to induct IPPs in KEL system, if any (with KEL'	s Equity Stake)			
1	Addition of Orient Project (Dual Fuel)	Karachi West	200	2019-20	220.00
2	Addition of 450 MW RLNG Project	Bin Qasim	450	2020-21	392.00
3	Addition of 700 MW Datang Coal IPP	Bin Qasim	700	2021-22	1000.00
Plan	to induct IPPs in KEL system, if any (without b	(EL's Equity Stake	e)		
1	Addition of Oursun Solar	Gharo	50	2018-19	60.54
2	Addition of Captive Power Producers	-	16	2018-19	CPPs
3	Addition of Gharo Solar Project	Gharo	50	2019-20	41.62
4	Addition of Embedded Generation	Karachi West/East	200	2020-21	222.40
5	Addition of Burj Wind	Thatta	50	2020-21	92.00
6	Addition of Multiple Solar Projects	-	150	2020-21	125.00
7	Addition of Tapal Energy (WEL)	North-West Karachi	200	2021-22	219.20
8	Addition of Wind Project	Dhabeji	50	2021-22	63.00
9	Addition of KANUPP-II & III	Karachi West	500	2021-22	-
10	Decommissioning of Unit No. 3 & 4 of BOPS-I	Bin Oasim	(420)	2020-21	_

* Including simultaneous investment in the associated transmission projects as per NEPRA allowed.

** These are estimates and are subject to change.

Source: KEL

	Investmen	t Plan for I	Private Sector I	Power Generation	Projects
S. No.	Name of the Project	Capacity (MW)	Estimated Investment (Million US\$)	Achieved/ Expected COD	Latest Status of the Project
A: OI	L NIL			1	l .
B: PIF	PELINE QUALITY GAS/DUAL FU	IEL/LNG			
1	Punjab Thermal Power Project	1263	707.75	Open Cycle (800 MW) by Dec., 2018 Combined Cycle (1263 MW) by Nov., 2019	Plant is in the process of achieving Financial Close. Construction work has also been started.
C: DE	DICATED GAS FIELDSN I L				
D: HY	(DEL				
2	Gulpur Hydropower Project	102	317.17	November, 2019	The project is under construction.
3	Karot Hydel Project	720	1,698.26	December, 2021	The project is under construction.
4	Suki Kinari Hydropower Project	870	1,707.00	December, 2022	The project is under construction.
5	Kohala Hydropower Project	1124	2,364.05	December, 2025	LOS issued. Financial close in progress.
6	Azad Pattan Hydel Project	700	1,357.16	June, 2025	LOS issued. Financial close under progress.
7	Mahl Hydropower Project	640	1,472.00	December, 2027	LOI issued. Financial Study completed and approved by POE. Tariff Petition is with NEPRA for determination/ approval.
8	Turtonas-Uzghor Hydropower Project	58	133.40	December, 2027	LOI issued. Feasibility Study in progress.
9	Athmuqam Hydropower Project	350	805.00	December, 2027	LOI issued. Feasibility Study in progress.
10	Kaigah Hydel Project	548	1,260.40	December, 2028	LOI issued. Feasibility Study completed. Sponsors submitted feasibility level tariff to NEPRA based on revised design.
11	Chakothi-Hattian Project	500	1,150.00		
12	Rajdhani HPP	132	303.60	COD will be	
13	Neckeherdm-Paur HPP	80	184.00	assessed after	Project will be advertised shortly.
14	Madian HPP	157	361.10	issuance of LOI.	
15	Sehra Hydel Project	130	299.00		
E: CO	AL	r	1	ſ	
16	Engro Powergen. Thar Coal Power Project	660	995.40	June, 2019	Project is under construction.
17	HUBCO Imported Coal PP	1320	1,912.20	August, 2019	Project is under construction.
18	Grange Imported Coal Power Project	163	331.40	August, 2020	LOS issued. Financial closing in progress.
19	Thal Nova Thar Coal Power Project	330	497.70	March, 2021	LOS issued. Financial closing in progress.
20	Thar Energy Limited (HUBCO Project)	330	497.70	March, 2021	LOS issued. Financial closing in progress. Construction work has also been started.
21	Lucky Electric Thar Coal PP	660	1,080.90	March, 2021	Plant is under construction.
22	Gwadar Imported Coal Power Project	300	435.00	April, 2021	LOI issued. Tariff determination in progress.
23	Siddiqsons Energy Thar Coal Power Project	330	410.19	June, 2021	LOS issued. Financial closing in progress.
24	Shanghai Electric Thar Coal Power Project	1320	1,912.20	August, 2021	LOS issued. Financial closing in progress.
25	Oracle Thar Coal Power Project	1320	1,640.76	December, 2022	Issuance of NTP & LOI to Phase-I (700 MW) in progress.

TABLE 33

Source: Private Power and Infrastructure Board, Islamabad

A :	Existing Projects (in-operation and under construction)				
S. No.	Name of Project	Capacity (MW)	COD/ Expected COD	Estimated Cost (US\$ Million)	Latest Status of the Project
Wind	Power Projects:				
1	FEC Energy Limited	49 50	May 2013	133 56	In Operation
2	Zorlu Energy Pakistan Limited	56.40	July, 2013	143.74	In Operation
3	Three Gorges First Wind Farm Pakistan (Pvt.) Ltd.	49.50	November, 2014	124.82	In Operation
4	Foundation Wind Energy-II Limited	50.00	December, 2014	124.91	In Operation
5	Foundation Wind Energy-I Limited	50.00	April, 2015	125.89	In Operation
6	Sapphire Wind Power Company (Pvt.) Limited	52.80	November, 2015	129.36	In Operation
7	Metro Power Company (Pvt.) Limited	50.00	September, 2016	125.24	In Operation
8	Yunus Energy Limited	50.00	September, 2016	131.00	In Operation
9	Tapal Wind Energy (Pvt.) Limited	30.00	October, 2016	78.60	In Operation
10	Tenega Generasi Limited	49.50	October, 2016	123.13	In Operation
11	Master Wind Energy (Pvt.) Limited	52.80	October, 2016	125.48	In Operation
12	Gul Ahmed Wind Power Limited	50.00	October, 2016	131.00	In Operation
13	HydroChina Dawood Power (Pvt.) Limited	49.50	April, 2017	121.75	In Operation
14	Sachal Energy Development (Pvt.) Limited	49.50	April, 2017	133.92	In Operation
15	United Energy Pakistan Limited	99.00	June, 2017	242.55	In Operation
16	Hawa Energy (Pvt.) Limited	49.74	March, 2018	107.50	In Operation
17	Jhampir Wind Power (Pvt.) Limited	49.74	March, 2018	106.64	In Operation
18	Artistic Energy (Pvt.) Limited	49.30	March, 2018	129.16	In Operation
19	Three Gorges Second Wind Farm Pakistan (Pvt.) Limited	49.50	June, 2018	106.42	In Operation
20	Three Gorges Third Wind Farm Pakistan (Pvt.) Limited	49.50	July, 2018	106.42	Under Construction
21	Tricon Boston Consulting Corporation (Pvt.) Limited (A)	49.60	September, 2018	106.64	Under Construction
22	Tricon Boston Consulting Corporation (Pvt.) Limited (B)	49.60	September, 2018	106.64	Under Construction
23	Tricon Boston Consulting Corporation (Pvt.) Limited (C)	49.60	September, 2018	106.64	Under Construction
24	Zephyr Power (Pvt.) Limited	48.30	November, 2018	106.50	Under Construction
Solar	[•] Power Projects:				
25	Quaid-e-Azam Solar Power (Pvt.) Limited	100.00	July, 2015	151.40	In Operation
26	Appolo Solar Development Pakistan Limited	100.00	May, 2016	151.40	In Operation
27	Best Green Energy Pakistan (Pvt.) Limited	100.00	July, 2016	151.40	In Operation
28	Crest Energy Pakistan Limited	100.00	July, 2016	151.40	In Operation
29	Harappa Solar (Pvt.) Limited	18.00	October, 2017	19.21	In Operation
30	AJ Power (Pvt.) Limited	12.00	December, 2017	12.80	In Operation
Baga	sse/Biomass Co-Generation Projects:				
31	JDW Sugar Mills Limited (Unit-II)	26.35	June, 2014	26.24	In Operation
32	JDW Sugar Mills Limited (Unit-III)	26.35	October, 2014	26.24	In Operation
33	RYK Mills Limited	30.00	March, 2015	29.88	In Operation
34	Chiniot Power Limited	62.40	November, 2015	62.15	In Operation
35	Hamza Sugar Mills Limited	15.00	March, 2017	14.94	In Operation
36	Layyah Sugar Mills	41.00	December, 2017	40.84	In Operation
37	Almoiz Industries Limited	36.00	February, 2019	35.86	Under Construction
38	Chanar Energy Limited	22.00	February, 2019	21.91	Under Construction
39	Etihad Power Generation Limited	74.40	February, 2019	74.10	Under Construction
B:	Future Upcoming Projects				
Winc	Power Projects:		tier line		
1	Western Energy (Pvt.) Limited	50.00	2021	63.18	Tariff and Generation
2	Shaheen Foundation, PAF	51.00	2021	64.15	Licence acquired.
3	Trans Atlantic Energy (Pvt.) Limited	50.00	2021		Tariff Petition filed.
4	Burj Wind Energy (Pvt.) Limited	14.00	2021		LOI Stage

TABLE 34 Status of Renewable Energy Projects

S. No.	Name of Project	Capacity (MW)	COD/ Expected COD	Estimated Cost (US\$ Million)	Latest Status of the Project
Sola	r PV Power Projects:				
5	Access Solar (Pvt.) Limited	11.52	2020	12.29	
6	Buksh Solar (Pvt.) Limited	10.00	2020	10.67	LOS stage,
7	Safe Solar Power (Pvt.) Limited	10.28	2020	10.97	projects
8	Blue Star Hydel (Pvt.) Limited	1.00	2020	1.07	agreements to
9	Access Electric (Pvt.) Limited	11.52	2020	12.29	be signed.
10	IPS 22 (Pvt.) Limited	50.00	2021	38.00	LOI Stage
11	IPS 23 (Pvt.) Limited	50.00	2021	38.00	LOI Stage
12	IPS 24 (Pvt.) Limited	50.00	2021	38.00	LOI Stage
13	RE Solar-I (Pvt.) Limited	20.00	2021	15.10	LOI Stage
14	RE Solar-II (Pvt.) Limited	20.00	2021	15.10	LOI Stage
15	Jan Solar (Pvt.) Limited	10.00	2021	7.50	LOI Stage
16	Lalpir Solar Power (Pvt.) Limited	10.00	2021	7.50	LOI Stage
17	Siddiqsons Solar Limited	50.00	2021	38.00	LOI Stage
18	ET Solar-I (Pvt.) Limited	50.00	2021	38.00	LOI Stage
19	ET Solar-II (Pvt.) Limited	25.00	2021	18.88	LOI Stage
20	ACT Solar (Pvt.) Limited	50.00	2021	38.00	LOI Stage
21	Asia Petroleum	30.00	2021	22.65	LOI Stage
22	First Solar (Pvt.) Limited	2.00	2021	1.50	LOI Stage
Sola	r Grid Hybrid Projects:			•	
23	Master Solar (Pvt.) Limited	35.00	2021		LOI Stage
24	Gul Ahmed Energy Limited	50.00	2021		LOI Stage
25	China Three Gorges	100.00	2021		LOI Stage
26	Metro Solar Power (Pvt.) Limited	50.00	2021		LOI Stage
27	Sapphire Wind Power Company Limited	40.00	2021		LOI Stage
28	Fauji Fertilizer Company Limited	30.00	2021		LOI Stage
29	Tricon Boston Consulting Corporation (Pvt.) Limited (A)	25.00	2021		LOI Stage
30	Tricon Boston Consulting Corporation (Pvt.) Limited (B)	25.00	2021		LOI Stage
31	Tricon Boston Consulting Corporation (Pvt.) Limited (C)	25.00	2021		LOI Stage
32	Burj Solar Energy (Pvt.) Limited	30.00	2021		LOI Stage
33	Tenaga Generasi	30.00	2021		LOI Stage
34	Younus Energy Limited	30.00	2021		LOI Stage
35	Zorlu Enerji Elektrik Uretim A.S	30.00	2021		LOI Stage
36	Foundation Wind Energy-I	40.00	2021		LOI Stage
37	Foundation Wind Energy-II	40.00	2021		LOI Stage
Baga	sse/Biomass Co-Generation Projects:				
38	Shahtai Sugar Mills Limited	32.00	2020	31.87	LOS Stage
39	Hunza Power (Pvt.) Limited	49,80	2020	49.60	LOS Stage
40	Bahawalpur Energy Limited	31.20	2020	31.08	LOS Stage
41	Indus Energy Limited	31.00	2020	30.88	LOS Stage
42	Ittefag Power (Pvt.) Limited	31.20	2020	31.08	LOS Stage
43	Kashmir Power (Pvt.) Limited	40.00	2020	39.84	LOS Stage
44	Alliance Sugar Mills Limited	30.00	2020	29.88	LOS Stage
45	RYK Energy Limited	25.00	2020	24.90	LOS Stage
46	Two Star Industries (Pvt.) Limited	49,80	2020	48.70	LOS Stage
47	Mirpur Khas Energy Limited	26.00	2020	25.90	LOS Stage
48	TAY Powergen Company (Pvt.) Limited	30.00	2020	29.88	LOS Stage
49	Hamza Sugar Mill Limited (Unit-II)	30.00	2020	29.88	LOS Stage
50	Faran Power (Pvt.) Limited	26.50	2020	26.39	LOS Stage
51	Sheikhoo Power Limited	30.00	2020	29.88	LOS Stage
52	Mehran Energy Limited	26.50	2020	26.39	LOS Stage

= = = = = = State of Industry Report 2018

S. No.	Name of Project	Capacity (MW)	COD/ Expected COD	Estimated Cost (US\$ Million)	Latest Status of the Project
53	Habib Sugar Mills Limited	26.50	2020	26.39	LOS Stage
54	Sadiqabad Power (Pvt.) Limited	45.00	2021	44.82	LOI stage, tariff
55	Gothki Power (Pvt.) Limited	45.00	2021	44.82	acquired.
56	Safina Sugar Mills Limited	20.00	2021		LOI Stage
57	Almas Seyyam (Pvt.) Limited	34.50	2021		LOI Stage
58	Al-Mughani Industries (Pvt.) Limited	40.00	2021		LOI Stage
59	Digri Gen. Limited	25.00	2021		LOI Stage
60	Darya Khan Power Generation (Pvt.) Limited	40.00	2021		LOI Stage
61	Ranipur Energy (Pvt.) Limited	60.00	2021		LOI Stage
62	Popular Energy (Pvt.) Limited	30.00	2021		LOI Stage
63	Hamza Sugar Mill Limited (Unit-III)	15.00	2021		LOI Stage
Smal	l Hydel Projects:				
64	Khyber Power Company (Pvt.) Limited	40.00	2022		LOI/Feasibility Stage

Source: Alternative Energy Development Board, Islamabad

11.8 ECONOMIC LOAD DESPATCH SYSTEM

Based on the variable component (including FCC and variable O&M) of power plants, the National Power Control Centre, Islamabad decides the operation and load despatch of power plants in the country except the power plants operated by K-Electric. Merit Order position of power plants in the area of NTDC and K-Electric, during 2017-18 is given in following two tables:

Ordor			A	s on 26 th June,	2018	Status in Last
in Merit	Plant Groups	Fuel Type	Fuel Cost (Rs./kWh)	O&M Cost (Rs./kWh)	Specific Cost (Rs./kWh)	Year Merit Order (16-06-2017)
1	Liberty (upto 61.904 GWh)	Gas	1.06488	0.34508	1.40996	2
2	Uch (upto 152.375 GWh)	Gas	1.38429	0.24870	1.67159	1
3	Uch (+ 152.375 GWh)	Gas	3.17080	0.24870	3.45810	3
4	Guddu 747 (CCP)	Gas	3.46850	0.29980	3.76830	4
5	НСРС	Gas	3.25904	0.52860	3.78764	5
6	KAPCO B-I (CC)	Gas	3.97230	0.27625	4.24855	
7	Foundation Power	Gas	3.86800	0.42240	4.29040	7
8	Guddu B-I (CCP) (Unit 11-13)	Gas	4.26650	0.06890	4.33540	8
9	Engro Power Gen.	Gas	4.15640	0.37290	4.52930	10
10	GTPS Faisalabad B-IV (CC) (Unit 5-9)	Gas	4.53270	0.13360	4.66630	16
11	KAPCO B-II (CC)	Gas	4.35695	0.32313	4.68008	
12	Guddu B-II (CCP) (Unit 5-10)	Gas	4.74030	0.06890	4.80920	14
13	Uch-II	Gas	4.78550	0.13940	4.92490	15
14	KAPCO B-III (CC)	Gas	4.50617	0.62285	5.12902	
15	Port Qasim	Coal	4.71640	0.44630	5.16270	
16	GTPS Kotri B-III (CCP) (Unit 3-7)	Gas	5.11850	0.09250	5.21100	17
17	Liberty (+ 61.904 GWh)	Gas	5.32440	0.34508	5.66948	11
18	Guddu B-III (Unit 3-4)	Gas	5.68830	0.06890	5.75720	18
19	Muzaffargarh B-II (Unit 4)	Gas	5.69070	0.13360	5.82430	24
20	Muzaffargarh B-I (Unit 3)	Gas	5.69920	0.13360	5.83280	25
21	Jamshoro B-II (Unit 4)	Gas	5.80620	0.09250	5.89870	19
22	Muzaffargarh B-I (Unit 1)	Gas	5.82440	0.13360	5.95800	25
23	Jamshoro B-II (Unit 3)	Gas	5.93360	0.09250	6.02610	21

TABLE 35 Merit Order for Power Generation Plants (PEPCO System) (Based on the revised fuel prices effective from 26-06-2018)

Order			As	s on 26 th June,	2018	Status in Last
in Merit	Plant Groups	Fuel Type	Fuel Cost (Rs./kWh)	O&M Cost (Rs./kWh)	Specific Cost (Rs./kWh)	Year Merit Order (16-06-2017)
24	Muzaffargarh B-I (Unit 2)	Gas	5.90340	0.13360	6.03700	25
25	Guddu B-IV (Unit 1-2)	Gas	6.09450	0.06890	6.16340	22
26	Jamshoro B-II (Unit 2)	Gas	6.09570	0.09250	6.18820	23
27	Muzaffargarh B-III (Unit 5)	Gas	6.05940	0.13360	6.19300	27
28	KAPCO B-I (S/Cycle)	Gas	5.95845	0.27625	6.23470	
29	Muzaffargarh B-III (Unit 6)	Gas	6.22520	0.13360	6.35880	27
30	Guddu B-I (W/O CCP) (Unit 11-13)	Gas	6.39975	0.06890	6.46865	8
31	KAPCO B-II (S/Cycle)	Gas	6.53543	0.32313	6.85856	
32	GTPS Faisalabad B-IV (S/Cycle) (Unit 5-9)	Gas	6.79905	0.13360	6.93265	16
33	Sahiwal Imported Coal	Coal	6.59040	0.44630	7.03670	12
34	Guddu B-II (W/O CCP) (Unit 5-10)	Gas	7.11045	0.06890	7.17935	14
35	KAPCO B-III (S/Cycle)	Gas	6.75926	0.62285	7.38211	
36	GTPS KOTI B-IV (W/O CCP) (Unit 3-7)	Gas	7.67780	0.09250	7.77030	17
37	NPPMC-Havell Banadur Shan (CC)	RLING	7.71409	0.32720	8.04129	35
38		RLING	7.01050	0.3268	0.14330	
39	VarP Blicki (CC)	RLING	7.02120	0.34690	0.10010	54 20
40	Orient Power	RLING	0.07540	0.39220	9.26760	20
41	Sapphira Electric		9.41030	0.24460	9.05510	29
42	Salf Power		9.41030	0.41190	9.02220	22
45	Halmore Bower		9.41120	0.41050	9.02770	32
44			10 12628	0.41040	10 /0253	35
45			10.12020	0.27023	11 01040	30
40	Muzaffargarh B-II (Unit 4)	Miv (**)	10.22740	0.13360	11 13015	30
47	Engro Power Gen	Mix (***)	10.75425	0.15500	11 13100	19
40	Muzaffargarh B-L (Unit 3)	Mix (**)	11 01220	0.13360	11 14580	45
50	Guddu B-III (Unit 3-4)	Mix (**)	11.09370	0.06890	11 16260	47
51	KAPCO B-I (CC)	RFO	10 72216	0.47919	11 20135	39
52	Muzaffargarh B-L (Unit 1)	Mix (**)	11 24345	0 13360	11 37705	47
53	Bousch	RING	11 39449	0.28155	11 39604	38
54	KAPCO B-II (CC)	RING	11,10683	0.32313	11,42996	45
55	Muzaffargarh B-I (Unit 2)	Mix (**)	11.38915	0.13360	11.52275	47
56	GTPS Faisalabad B-IV (Unit 5-9)	RLNG	11.55480	0.13360	11.68840	
57	Altern Energy (Phase-II)	RLNG	10.97991	0.71396	11.69387	
58	Lakhra Power	Coal	11.50627	0.19540	11.70167	9
59	Muzaffargarh B-III (Unit 5)	Mix (**)	11.67745	0.13360	11.81105	66
60	Gulf PowerGen	RFO	11.05810	0.94750	12.00560	68
61	NPPMC-Balloki (S/Cycle)	RLNG	11.74568	0.32680	12.07248	
62	KAPCO B-III (CC)	RLNG	11.48724	0.62285	12.11009	59
63	Jamshoro B-II (Unit 4)	Mix (**)	12.01920	0.09250	12.11170	41
64	Muzaffargarh B-III (Unit 6)	Mix (**)	11.98350	0.13360	12.11710	66
65	Jamshoro B-II (Unit 3)	Mix (**)	12.27900	0.09250	12.37150	43
66	KAPCO B-II (CC)	RFO	11.76775	0.67452	12.44227	58
67	Liberty Power Tech.	RFO	11.30410	1.14500	12.44910	53
68	Nishat Power	RFO	11.42560	1.03100	12.45660	52
69	GTPS Kotri B-III (CCP) (Unit 3-7)	RLNG	12.39930	0.09250	12.49180	
70	Jamshoro B-II (Unit 2)	Mix (**)	12.61770	0.09250	12.71020	46
71	Nishat Chunian	RFO	11.78160	1.02860	12.81020	51
72	Atlas Power	RFO	11.95100	1.03100	12.98200	54
73	HUBCO Narowal	RFO	12.04480	0.96550	13.01030	61
74	Attock Gen.	RFO	12.05190	1.04730	13.09920	37
75	Davis Energen	RLNG	12.68465	0.53547	13.22012	65

VIVII

Order			As	s on 26 th June,	2018	Status in Last
in Merit	Plant Groups	Fuel Type	Fuel Cost (Rs./kWh)	O&M Cost (Rs./kWh)	Specific Cost (Rs./kWh)	Year Merit Order (16-06-2017)
76	HUBCO	RFO	13.50722	0.19151	13.69873	56
77	KEL	RFO	13.42035	0.62291	14.04326	55
78	Jamshoro B-II (Unit 4)	RLNG	14.06530	0.09250	14.15780	
79	Jamshoro B-II (Unit 3)	RLNG	14.37400	0.09250	14.46650	
80	Muzaffargarh B-II (Unit 4)	RLNG	14.50690	0.13360	14.64050	
81	Muzaffargarh B-II (Unit 3)	RLNG	14.52860	0.13360	14.66220	
82	Altern (Phase-I)	RLNG	14.10809	0.71396	14.82205	
83	Jamshoro B-II (Unit 2)	RLNG	14.76640	0.09250	14.85890	
84	Lal Pir Power	RFO	14.69114	0.17843	14.86957	60
85	KAPCO B-I (CC)	HSD	14.63444	0.27778	14.91222	80
86	Muzaffargarh B-I (Unit 1)	RLNG	14.84780	0.13360	14.98140	
87	Pak Gen. Power	RFO	14.80533	0.17843	14.98376	62
88	Muzaffargarh B-I (Unit 2)	RLNG	15.04910	0.13360	15.18270	
89	Saba Power	RFO	15.09581	0.17849	15.27430	64
90	KAPCO B-I (S/Cycle)	RLNG	15.18942	0.27625	15.46567	36
91	Muzaffargarh B-II (Unit 4)	Mix (****)	15.40465	0.13360	15.53825	
92	Muzaffargarh B-I (Unit 3)	Mix (****)	15.42690	0.13360	15.56050	
93	Muzaffargarh B-III (Unit 5)	RLNG	15.44690	0.13360	15.58050	
94	Reshma PowerGen	RFO	14.92030	0.96170	15.88200	67
95	Muzaffargarh B-I (Unit 1)	Mix (****)	15.75515	0.13360	15.88875	
96	Muzaffargarh B-III (Unit 6)	RLNG	15.86940	0.13360	16.00300	
97	Muzaffargarh B-I (Unit 2)	Mix (****)	15.96200	0.13360	16.09560	
98	Jamshoro B-II (Unit 4)	Mix (****)	16.14875	0.09250	16.24125	
99	KAPCO B-II (CC)	HSD	16.06147	0.37347	16.43494	86
100	Muzaffargarh B-II (Unit 4)	RFO	16.30240	0.13360	16.43600	72
101	Muzaffargarh B-I (Unit 3)	RFO	16.32520	0.13360	16.45880	73
102	Muzaffargarh B-III (Unit 5)	Mix (****)	16.37120	0.13360	16.50480	
103	KAPCO B-I (S/Cycle)	RFO	16.08324	0.47919	16.56243	39
104	Guddu B-III (CCP) (Unit 3-4)	RFO	16.49910	0.06890	16.56800	75
105	Jamshoro B-II (Unit 3)	Mix (****)	16.49920	0.09250	16.59170	
106	Orient Power	HSD	16.23560	0.40140	16.63700	81
107	Halmore Power	HSD	16.07296	0.60400	16.67696	82
108	Sapphire Electric	HSD	16.09130	0.59450	16.68580	83
109	Muzaffargarh B-I (Unit 1)	RFO	16.66250	0.13360	16.79610	73
110	Muzaffargarh B-III (Unit 6)	Mix (****)	16.80560	0.13360	16.93920	
111	Saif Power	HSD	16.37430	0.60120	16.97550	84
112	KAPCO B-II (S/Cycle)	RLNG	16.66025	0.32313	16.98338	45
113	Muzaffargarh B-I (Unit 2)	RFO	16.87490	0.13360	17.00850	73
114	Jamshoro B-II (Unit 2)	Mix (****)	16.95305	0.09250	17.04555	
115	Jamshoro B-I (Unit 1)	RFO	17.04300	0.09250	17.13550	69
116	Muzaffargarh B-III (Unit 5)	RFO	17.29550	0.13360	17.42910	79
117	KAPCO B-III (CC)	HSD	16.61098	0.94312	17.55410	90
118	Engro Power Gen.	HSD	17.35210	0.38060	17.73270	85
119	KAPCO B-III (S/Cycle)	RLNG	17.23086	0.62285	17.85371	59
120	Muzaffargarh B-III (Unit 6)	RFO	17.74180	0.13360	17.87540	66
121	Jamshoro B-II (Unit 4)	RFO	18.23220	0.09250	18.32470	74
122	KAPCO B-II (S/Cycle)	RFO	17.65163	0.67452	18.32615	58
123	Jamshoro B-II (Unit 3)	RFO	18.62440	0.09250	18.71690	76
124	GTPS Faisalabad B-IV (CC) (Unit 5-9)	HSD	19.08560	0.13360	19.21920	89
125	Jamshoro B-II (Unit 2)	RFO	19.13970	0.09250	19,23220	78
126	KAPCO B-I (S/Cycle)	HSD	21.95166	0.27778	22.22944	80
127	GTPS Kotri B-III (Unit 3-7)	HSD	22.37450	0.08990	22.46440	91

Ordor			As	Status in Last		
in Merit	Plant Groups	Fuel Type	Fuel Cost (Rs./kWh)	O&M Cost (Rs./kWh)	Specific Cost (Rs./kWh)	Year Merit Order (16-06-2017)
128	KAPCO B-II (S/Cycle)	HSD	24.09221	0.37347	24.46568	86
129	KAPCO B-III (S/Cycle)	HSD	24.91647	0.94312	25.85959	90
130	GTPS Faisalabad B-IV (S/Cycle) (Unit 5-9)	HSD	28.62840	0.13360	28.76200	89
131	GTPS Kotri B-IV (Unit 1-2)	HSD	45.46540	0.08990	45.55530	93

(**) Mixed [50% RFO and 50% Gas] (***) Mixed [50% Gas and 50% HSD] (****) Mixed [50% RFO and 50% RLNG] Source: National Power Control Centre, Islamabad

TABLE 36
Merit Order for Power Generation Plants (K-Electric System)
(Based on the Present Net Heat Rate at 100% Plant Factor) (Rs./kWh)

c.		Fuel	As on 31 st December, 20			As on 31 st March, 2018			As on 30 th June, 2018		
S. No.	Plant Groups	Туре	Fuel Cost	O&M Cost	Total Cost	Fuel Cost	O&M Cost	Total Cost	Fuel Cost	O&M Cost	Total Cost
1	BQPS-II	Gas	6,570	1,680	8,250	8,712	2,454	11,166	13,481	3,379	16,860
2	Korangi CCPP	Gas	1,627	969	2,596	1,969	1,454	3,423	3,886	1,997	5,883
3	SITE GTPS-II	Gas	821	593	1,414	1,243	917	2,160	2,158	1,223	3,381
4	Korangi GTPS-II	Gas	638	632	1,270	734	955	1,689	1,520	1,330	2,850
5	BQPS-I	Gas	1,796	2677	24 200	2,247	1 201	2/ 801	4,524	6 0 2 5	56 850
6	BQPS-I	FO	19,727	2,011	2,677 24,200	28,350	4,204	54,001	46,301	0,025	0,050

Source: KEL

11.9 LICENSES GRANTED

In Pakistan, the generation of electric power for the purpose of sale, is a licensed activity. NEPRA grants generation licence to different power producing companies who intend to sale their electric power to national grid or to sale their generated power to Bulk Power Consumers. However, there is no need of generation licence for those electric power producers which produce electricity for their own use. The details of all categories of licenses granted by NEPRA under Sections 14B, 14C, 16, 17, 19 and 20 of NEPRA Act up to June, 2018 are given in the following tables:

TABLE 37-A

List of Generation Licensees (Hydel + Nuclear)							
S. No.	Name of Company and Location	Installed Capacity (MW) as per Licence	Fuel Type				
Hyde	el (Technology: Hydel)						
1	WAPDA Hydro Electric Power Company (Tarbela, Mangla, Warsak, Ghazi Barotha, Chashma etc.)	17,359.96	Storage Water/Run of River/Canal				
2	Malakand-III, Pakhtunkhwa Energy Development Organization (PEDO), Malakand Agency, Khyber Pakhtunkhwa	83.70	Run of River/Canal				
3	Blue Star Energy (Pvt.) Limited, Mardan, Khyber Pakhtunkhwa	3.021	Run of River/Canal				
4	SK Hydro (Pvt.) Limited, Manshera, Khyber Pakhtunkhwa	840.00	Run of River				
5	Pehur Hydropower Plant, PEDO, Swabi, Khyber Pakhtunkhwa	18.00	Canal/Run of River				
6	Olympus Energy (Pvt.) Limited, Gujrat, Punjab	20.0016	Canal/Run of River				
7	Punjnad Hydropower (Pvt.) Limited, Muzaffargarh, Punjab	15.00	Run of River				
8	Rasul Hydropower (Pvt.) Limited, Jhelum, Punjab	20.0016	Run of River				
9	Alka Power (Pvt.) Limited, Hafizabad, Punjab	1.80	Canal Fall				
10	Chenab Energy (Pvt.) Limited, Sahiwal, Punjab	4.80	Run/Fall of Canal				
11	Alka Power (Pvt.) Limited, Sahiwal, Punjab	3.30	Canal Fall				
12	Frontier Mega Structure & Power (Pvt.) Limited, Mansehra, KPK	2.40	Run of River				
13	SAR Energy (Pvt.) Limited, Mardan, Khyber Pakhtunkhwa	1.72	Run of Canal				
14	Reshun Hydropower Plant, PEDO, Reshun Gol, Chitral, KPK	4.20	Canal/Run of River				
15	Shishi Hydropower Plant, PEDO, Drosh, Chitral, Khyber Pakhtunkhwa	1.875	Canal/Run of River				

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S. No.	Name of Company and Location	Installed Capacity (MW) as per Licence	Fuel Type
16	Karot Power Company (Pvt.) Limited, Karot, Rawalpindi, Punjab	732.00	Run of River
17	Machai Hydropower Plant, PEDO, Mardan, Khyber Pakhtunkhwa	2.60	Low Head/Canal Fall
18	Ranolia Hydropower Plant, PEDO, Ranolia Khwar, Kohistan, KPK	17.00	Run of River
19	Karimi Energy (Pvt.) Limited, Haripur, Khyber Pakhtunkhwa	3.60	Canal/Run of River
20	Muntaha Power (Pvt.) Limited, Muzaffargarh, Punjab	2.60	Canal/Run of River
21	Marala Hydropower Project, Punjab Power Development Company Limited (PPDCL), Sialkot, Punjab	8.088	Canal Fall/Run of River
22	Pakpattan Hydropower Project, PPDCL, Pakpattan, Punjab	3.01	Canal/Run of River
23	Deg-Outfall Hydropower Project, PPDCL, Sheikhpura, Punjab	4.268	Low Head Canal Fall
24	Chianwali Hydropower Project, PPDCL, Gujranwala, Punjab	5.674	Low Head Canal Fall
25	Trident Power JB (Pvt.) Limited, Okara, Punjab	4.65	Run of Canal
26	Daral Khwar Hydropower Project, PEDO, Daral Khwar, Swat, KPK	36.60	Run of River
27	Gugera Hydropower Company (Pvt.) Limited, Nankana Sahib, Punjab	3.60	Run of Canal
28	Mandi Baha Ud Din Energy Limited, Mandi Baha Ud Din, Punjab	3.30	Run of Canal
29	Mehar Hydropower (Pvt.) Limited, Kasur, Punjab	10.49	Run of Canal
30	Sarhad Rural Support Programme, Chitral, Khyber Pakhtunkhwa	2.00	Run of River
31	Blue Star Energy (Pvt.) Limited, Gujrat, Punjab	2.80	Run of Canal
Nucl	ear (Technology: Pressurized Heavy Water Reactor)		
1	Chashma Nuclear Power Plant (Unit-1), Mianwali, Punjab	325.00	Uranium
2	Karachi Nuclear Power Plant, Karachi, Sindh	137.00	Uranium
3	Chashma Nuclear Power Plant (Unit-2), Mianwali, Punjab	325.00	Uranium
4	Chashma Nuclear Power Plant (Unit-3), Mianwali, Punjab	340.00	Uranium
5	Chashma Nuclear Power Plant (Unit-4), Mianwali, Punjab	340.00	Uranium

Note: Shaded areas indicate licenses issued in 2017-18.

Source: National Electric Power Regulatory Authority, Islamabad

TABLE 37-B

List of Generation Licensees (Wind + Solar + Bagasse/Biomass)

S. No.	Name of Company and Location	Installed Cap. (MW) as per Licence	Fuel Type	Technology	
Wind Power Projects under Renewable Energy Policy 2006					
1	Foundation Wind Energy-II (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine	
2	Milergo Pakistan Limited, Thatta, Sindh	250.00	Wind	Wind Turbine	
3	Green Power (Pvt.) Limited, Thatta, Sindh	49.50	Wind	Wind Turbine	
4	Tenaga Generasi Limited, Thatta, Sindh	49.50	Wind	Wind Turbine	
5	HydroChina Dawood Power (Pvt.) Limited, Thatta, Sindh	49.50	Wind	Wind Turbine	
6	Zorlu Enerji Pakistan Limited, Jhimpir, Thatta, Sindh	56.40	Wind	Wind Turbine	
7	FFC Energy Limited, Jhimpir, Thatta, Sindh	49.50	Wind	Wind Turbine	
8	Three Gorges First Wind Firm Pakistan (Pvt.) Limited, Thatta, Sindh	49.50	Wind	Wind Turbine	
9	Foundation Wind Energy-I Limited, Thatta, Sindh	50.00	Wind	Wind Turbine	
10	Gul Ahmed Wind Power Limited, Thatta, Sindh	50.00	Wind	Wind Turbine	
11	Metro Power Company Limited, Thatta, Sindh	50.00	Wind	Wind Turbine	
12	Master Wind Energy Limited, Thatta, Sindh	52.80	Wind	Wind Turbine	
13	Yunus Energy Limited, Thatta, Sindh	50.00	Wind	Wind Turbine	
14	Zephyr Power (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine	
15	Sapphire Wind Power Company Limited, Thatta, Sindh	52.80	Wind	Wind Turbine	
16	Pakistan Wind Energy Generation (Pvt.) Limited, Thatta, Sindh	4.80	Wind	Wind Turbine	
17	Sachal Energy Development (Pvt.) Limited, Thatta, Sindh	49.50	Wind	Wind Turbine	
18	Finergy (Pvt.) Limited, Thatta, Sindh	49.60	Wind	Wind Turbine	
19	UEP Wind Power (Pvt.) Limited, Thatta, Sindh	99.00	Wind	Wind Turbine	
20	Tapal Wind Energy (Pvt.) Limited, Thatta, Sindh	30.00	Wind	Wind Turbine	
21	Hawa Energy (Pvt.) Limited, Thatta, Sindh	49.74	Wind	Wind Turbine	
22	Jhimpir Power (Pvt.) Limited, Thatta, Sindh	49.74	Wind	Wind Turbine	

S. No.	Name of Company and Location	Installed Cap. (MW) as per Licence	Fuel Type	Technology
23	Titan Energy Pakistan (Pvt.) Limited, Thatta, Sindh	9.00	Wind	Wind Turbine
24	Hartford Alternative Energy (Pvt.) Limited, Thatta, Sindh	49.30	Wind	Wind Turbine
25	Three Gorges Second Wind Farm Pakistan (Pvt.) Limited, Thatta, Sindh	49.50	Wind	Wind Turbine
26	Three Gorges Third Wind Farm Pakistan (Pvt.) Limited, Thatta, Sindh	49.50	Wind	Wind Turbine
27	Tricon Boston Consulting Corp. (Pvt.) Limited (Plant-A), Thatta, Sindh	49.74	Wind	Wind Turbine
28	Tricon Boston Consulting Corp. (Pvt.) Limited (Plant-B), Thatta, Sindh	49.74	Wind	Wind Turbine
29	Tricon Boston Consulting Corp. (Pvt.) Limited (Plant-C), Thatta, Sindh	49.74	Wind	Wind Turbine
30	Norinco International Thatta Power (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
31	Western Energy (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
32	Zulaikha Energy (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
33	Din Energy Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
34	Cacho Wind Energy (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
35	Artistic Wind Power (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
36	ACT2 Wind (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
37	Trans Atlantic Energy (Pvt.) Limited, Thatta, Sindh	48.30	Wind	Wind Turbine
38	Shaheen Renewable Energy-I (Pvt.) Limited, Thatta, Sindh	49.74	Wind	Wind Turbine
39	Iran-Pak Wind Power (Pvt.) Limited, Thatta, Sindh	49.50	Wind	Wind Turbine
40	Gul Ahmed Electric Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
41	Noor Solar Energy (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
42	Metro Wind Power Limited, Thatta, Sindh	60.00	Wind	Wind Turbine
43	NASDA Green Energy (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
44	Indus Wind Energy Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
45	Master Green Energy Limited, Jamshoro, Sindh	50.00	Wind	Wind Turbine
46	Norinco International Thatta Power (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
47	Lakside Energy (Pvt.) Limited, Thatta, Sindh	50.00	Wind	Wind Turbine
Sola	Power Projects under Renewable Energy Policy 2006			
1	DACC Power Generation Company (Pvt.) Limited, Bhawalpur, Punjab	50.00	P.V Cell	P.V Cell
2	Sanjwal Solar Power (Pvt.) Limited, Attock, Punjab	5.04	P.V Cell	P.V Cell
3	Access Solar (Pvt.) Limited, Hattar, Punjab	11.52	P.V Cell	P.V Cell
4	Buksh Solar (Pvt.) Limited, Bahawalnagar, Punjab	11.664	P.V Cell	P.V Cell
5	Access Electric (Pvt.) Limited, Jehlum, Punjab	10.00	P.V Cell	P.V Cell
6	Quaid-e-Azam Solar Power (Pvt.) Limited, Bahawalpur, Punjab	100.00	P.V Cell	P.V Cell
7	Safe Solar Power (Pvt.) Limited, Bahawalpur, Punjab	10.2816	P.V Cell	P.V Cell
8	Roshan Power (Pvt.) Limited, Kasur, Punjab	11.00	P.V Cell	P.V Cell
9	First Solar (Pvt.) Limited, Chakwal, Punjab	2.0166	P.V Cell	P.V Cell
10	Blue Star Hydel (Pvt.) Limited, Jhelum, Punjab	1.00	P.V Cell	P.V Cell
11	Blue Star Electric (Pvt.) Limited, Jhelum, Punjab	1.00	P.V Cell	P.V Cell
12	Ramzan Energy Limited, Chiniot, Punjab	1.52	P.V Cell	P.V Cell
13	Crest Energy Pakistan Limited, Bahawalpur, Punjab	100.00	P.V Cell	P.V Cell
14	Appolo Solar Development Pakistan Limited, Bahawalpur, Punjab	100.00	P.V Cell	P.V Cell
15	Best Green Energy Pakistan Limited, Bahawalpur, Punjab	100.00	P.V Cell	P.V Cell
16	Harappa Solar (Pvt.) Limited, Sahiwal, Punjab	18.036	P.V Cell	P.V Cell
17	AJ Power (Pvt.) Limited, Khushab, Punjab	12.00	P.V Cell	P.V Cell
18	Oursun Pakistan Limited, Thatta, Sindh	50.00	P.V Cell	P.V Cell
19	Shamas Power (Pvt.) Limited, Lahore, Punjab	0.08	P.V Cell	P.V Cell
20	Zhenfa Pakistan New Energy Company (Pvt.) Limited, Layyah, Punjab	100.00	P.V Cell	P.V Cell
21	HNDS Energy (Pvt.) Limited, Sukkur, Sindh	50.00	P.V Cell	P.V Cell
22	Helios Power (Pvt.) Limited, Sukkur, Sindh	50.00	P.V Cell	P.V Cell
23	Meridian Energy (Pvt.) Limited, Sukkur, Sindh	50.00	P.V Cell	P.V Cell
24	Zorlu Solar Pakistan (Pvt.) Limited, Bhawalpur, Punjab	100.00	P.V Cell	P.V Cell
25	Siachen Energy Limited, Thatta, Sindh	100.00	P.V Cell	P.V Cell

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S. No.	Name of Company and Location	Installed Cap. (MW) as per Licence	Fuel Type	Technology				
Baga	Jasse/Biomass Power Projects under Renewable Energy Policy 2006							
1	SSJD Bioenergy Limited, Mirpur Khas, Sindh	12.00	Bagasse	Bagasse				
2	Lumen Energia (Pvt.) Limited, Jhang, Punjab	12.00	Biomass	Steam Turbine				
3	Shakarganj Mills Limited-II, Jhang, Punjab	12.00	Bagasse+FO	Steam Turbine				
4	Pak Ethanol (Pvt.) Limited, Tando Muhammad Khan, Sindh	9.132	Biogas	Gas Engine				
5	JDW Sugar Mills Limited, Rahim Yar Khan, Punjab	26.35	Bagasse+Biomass	Steam Turbine				
6	JDW Sugar Mills Limited, Ghotki, Sindh	26.35	Bagasse+Biomass	Steam Turbine				
7	Chiniot Power Limited, Chiniot, Punjab	62.40	Bagasse	Steam Turbine				
8	RYK Mills Limited, Rahim Yar Khan, Punjab	30.00	Bagasse	Steam Turbine				
9	Hamza Sugar Mills Limited, Rahim Yar Khan, Punjab	30.00	Bagasse	Steam Turbine				
10	Alliance Power (Pvt.) Limited, Ghotki, Sindh	30.00	Bagasse	Steam Turbine				
11	Ansari Powergen Company (Pvt.) Limited, Tando Muhammad Khan, Sindh	30.00	Bagasse	Steam Turbine				
12	TAY Powergen Company (Pvt.) Limited, Tando Allayar, Sindh	30.00	Bagasse	Steam Turbine				
13	Bandhi Powergen Company (Pvt.) Limited, Shaheed Benazirabad, Sindh	30.00	Bagasse	Steam Turbine				
14	Etihad Power Generation Limited, Rahim Yar Khan, Punjab	74.40	Bagasse	Steam Turbine				
15	The Thal Industries Corporation Limited, Chiniot, Punjab	20.00	Bagasse	Steam Turbine				
16	The Thal Industries Corporation Limited, Layyah, Punjab	41.00	Bagasse	Steam Turbine				
17	Almoiz Industries Limited, Mianwali, Punjab	36.00	Bagasse	Steam Turbine				
18	Chanar Energy Limited, Faisalabad, Punjab	22.00	Bagasse	Steam Turbine				
19	Shahtaj Sugar Mills Limited, Mandi Bahauddin, Punjab	32.00	Bagasse	Steam Turbine				
20	Hunza Power (Pvt.) Limited, Jhang, Punjab	49.80	Bagasse	Steam Turbine				
21	Bahawalpur Energy Limited, Bahawalpur, Punjab	31.20	Bagasse	Steam Turbine				
22	Ittefaq Power Limited, Bahawalpur, Punjab	31.20	Bagasse	Steam Turbine				
23	Kashmir Power (Pvt.) Limited, Jhang, Punjab	40.00	Bagasse	Steam Turbine				
24	RYK Energy Limited, Rahim Yar Khan, Punjab	25.00	Bagasse	Steam Turbine				
25	Faran Power Limited, Tando Muhammad Khan, Sindh	26.50	Bagasse	Steam Turbine				
26	Indus Energy Limited, Rajan Pur, Punjab	31.00	Bagasse	Steam Turbine				
27	Mirpurkhas Energy Limited, Mirpurkhas, Sindh	26.00	Bagasse	Steam Turbine				
28	Sheikhoo Power (Pvt.) Limited, Muzaffargarh, Punjab	30.00	Bagasse	Steam Turbine				
29	Two Star Energy (Pvt.) Limited, Toba Tek Singh, Punjab	49.80	Bagasse	Steam Turbine				
30	Mehran Energy Limited, Tando Allahyar, Sindh	26.50	Bagasse	Steam Turbine				
31	Hamza Sugar Mills Limited, Rahim Yar Khan, Punjab	30.00	Bagasse	Steam Turbine				
32	HSM Energy Limited, Shaheed Benazirabad, Sindh	26.50	Bagasse	Steam Turbine				
33	Ghotki Power (Pvt.) Limited, Ghotki, Sindh	45.00	Bagasse	Steam Turbine				

Note: Shaded areas indicate licenses issued in 2017-18. Source: National Electric Power Regulatory Authority, Islamabad

TABLE 37-C

List of Generation Licensees (SPPs, CPPs, IGCs, N-CPPs, DGPs, STIPPs and other IPPs)

S.	Name of Company and Location	Installed Cap. (MW) as per	Fuel Type	Technology-wise Capacity (MW)	
NO.		Licence		Technology	Capacity
Smal	l Power Producers (SPPs)				
1	ICI Pakistan PowerGen Limited, Sheikhupura, Punjab	14.00	HFO	DE	14.00
2	Sapphire Power Generation Limited, Sheikhupura, Punjab	56.80	HFO+Gas	DE+GE	52.20+4.60
3	Crescent Powertec Limited, Shahkot, Punjab	10.60	HFO	DE	10.60
4	Ellcot Spinning Mills Limited, Kotri (Sindh), Kasur and Sheikhupura (Punjab)	21.96	HFO+HSD	DE	13.80+8.16
5	Mahmood Textile Mills Limited, Muzaffargarh, Punjab	15.05	FO+Gas	DE+GE	9.20+5.85
6	Gulistan Power Generation Limited, Sheikhupura, Kasur (Punjab) and Kotri (Sindh)	20.945	HSD+HFO+Gas	DE+GE	11.82+4.68 +4.45
7	Monnoo Energy Limited, Sheikhupura, Punjab	4.60	HFO	DE	4.60
8	Sitara Energy Limited, Faisalabad, Punjab	87.82	HFO+Gas	DE+GE	51.62+36.20

S.		Installed Cap (MW)		Technology-wise		
No.	Name of Company and Location	as per	Fuel Type	Capacit	y (MW)	
		Licence		Technology	Capacity	
9	Shahero Ehergy Limited, Kotri (Sindh) and Sheikhupura (Punjab)	37.33	HFO+Gas	DE+GE	3.635+ 33.695	
10	Quetta Textile Mills Limited, Kotri, Sindh	8.10	Gas	GE	8.10	
11	Ideal Energy Limited, Faisalabad, Punjab	11.82	HFO	DE	11.82	
12	Genertech Pakistan Limited, Bhai Pheru, Punjab	27.52	HFO	DE	27.52	
13	Zeeshan Energy Limited, Faisalabad, Punjab	6.90	HFO	DE	6.90	
14	Ibrahim Fibres Limited, Faisalabad, Punjab	58.30	HFO+HSD+Gas	RE	58.30	
15	Kohinoor Mills Limited, Kasur, Punjab	31.23	HSD+HFO+Gas	DE+GE	31.23	
Capti	ve Power Producers (CPPs)	•	•		•	
1	Shakarganj Mills Limited, Jhang, Punjab	8.512	Biogas	GE	8.512	
2	Prosperity Weaving Mills Limited, Sheikhupura, Punjab	6.90	HFO	DE	6.90	
3	Almoiz Industries Limited, Dera Ismail Khan, KPK	43.60	Bagasse+FO	ST	43.60	
4	Roomi Fabrics Limited, Multan, Punjab	15.87	Gas	GE	15.87	
5	Din Textile Mills Limited, Kasur, Punjab	9.68	HSD+FO+Gas	DE+GE +ST	5.18+4.50	
6	Pakistan Steel Mills Limited, Karachi, Sindh	165.00	Gas	ST	165.00	
7	Nishat Mills Limited, Bhikki, Punjab	128.241	HSD+FO+Gas	DE+GE +ST	128.241	
8	Indus Sugar Mills Limited, Rajanpur, Punjab	11.00	Bagasse+FO	ST	11.00	
9	Colony Mills Limited, Multan, Punjab	36.132	Gas	GE	36.132	
10	JDW Sugar Mills Limited, Rahim Yar Khan, Punjab	31.00	Bagasse+FO	ST	31.00	
11	Mekotex (Pvt.) Limited, Dadu, Sindh	5.01	Gas	GE	5.01	
12	Brothers Sugar Mills Limited, Kasur, Punjab	13.00	Bagasse+FO	ST	13.00	
13	Al-Noor Sugar Mills Limited, Shaheed Benazirabad, Sindh	36.80	Bagasse+FO	ST	36.80	
14	SUNEC Wind Power Generation (Pvt.) Limited, Chakwal, Punjab	0.05	Wind	WT	0.05	
15	Shadman Cotton Mills Limited, Nankana, Punjab	9.25	HSD+HFO+Gas	GE+DE	4.65+4.6	
16	Agar Textiles Mills (Pvt.) Limited, Jamshoro, Sindh	16.185	Gas	GE	16.185	
17	RYK Mills Limited, Rahim Yar Khan, Punjab	18.00	Bagasse+FO	ST	18.00	
18	Sheikhoo Sugar Mills Limited, Muzaffargarh, Punjab	18.00	Bagasse	ST	18.00	
19	Hi-Tech Pipes & Engineering Industries, Jamshoro, Sindh	3.78	Gas	GE	3.78	
20	Ashraf Sugar Mills Limited, Bahawalpur, Punjab	24.50	Bagasse+FO	ST	24.50	
21	Al-Abbas Sugar Mills Limited, Thatta, Sindh	15.00	Imported Coal	ST	15.00	
22	The Thal Industries Corporation Limited, Layyah, Punjab	30.70	Bagasse+FO	ST	30.70	
23	International Steel Limited, Karachi, Sindh	19.316	Gas	GE+ST	18.066+1.250	
24	International Industries Limited, Karachi, Sindh	4.38	Gas	GE	4.38	
25	Hamza Sugar Mills Limited, Rahim Yar Khan, Punjab	23.60	Bagasse+FO	ST	23.60	
26	Tuwairqi Steel Mills Limited, Karachi, Sindh	38.948	Gas+HSD	GE+ST	26.948+12.00	
27	Eithad Sugar Mills Limited, Rahim Yar Khan, Punjab	22.00	Bagasse+FO	ST	22.00	
28	Deharki Sugar Mills (Pvt.) Limited, Ghotki, Sindh	15.00	Bagasse+FO	ST	15.00	
29	Tando Allayar Sugar Mills (Pvt.) Limited, Tano Allahyar, Sindh	12.00	Bagasse+FO	ST	12.00	
30	Shakarganj Mills Limited, Jhang, Punjab	12.00	Bagasse+FO	ST	12.00	
31	Digri Sugar Mills Limited, Mirpur Khas, Sindh	6.00	Bagasse+FO	ST	6.00	
32	Salim Yarn Mills (Pvt.) Limited, Kotri, Sindh	2.70	Gas	GE	2.70	
33	Engro Powergen. Qadirpur Limited, Ghotki, Sindh	0.36	Solar Power	P.V Cell	0.36	
34	Fatima Sugar Mills Limited, Kot Addu, Punjab	23.55	Bagasse+FO	ST	23.55	
35	Bandhi Sugar Mills (Pvt.) Limited, Shaheed Benazirabad, Sindh	12.00	Bagasse+FO	ST	12.00	
36	Kamalia Sugar Mills Limited, Toba Tek Singh, Punjab	17.00	Bagasse+FO	ST	17.00	
37	Gadoon Textile Mills Limited, Swabi, KPK	56.47	HFO+Gas	RE	56.47	
38	Ramzan Sugar Mills Limited, Chiniot, Punjab	12.00	Bagasse+FO	ST	12.00	
39	Lottee Chemical Pakistan Limited, Karachi, Sindh	48.10	Gas	ST	48.10	
40	Noon Sugar Mills Limited, Sargodha, Punjab	14.80	Bagasse	ST	14.80	

S.	Name of Company and Location	Installed Cap. (MW)	Fuel Type	Technology-wise Capacity (MW)		
No.	······	as per Licence		Technology	Capacity	
41	Bahria Town Electric Supply Company (Pvt.) Limited, Rawalpindi, Punjab	10.00	Coal Water Slurry	DE	10.00	
42	Fatima Energy Limited, Muzaffargarh, Punjab	120.00	Biomass/Coal	ST	120.00	
43	Faran Sugar Mills Limited, Tando Muhammad Khan, Sindh	13.00	Biomass+FO	ST	13.00	
44	Chambar Sugar Mills (Pvt.) Limited, Tando Allahyar, Sindh	5.00	Bagasse+FO	ST	5.00	
45	Fimcotex Industries (Pvt.) Limited, Jamshoro, Sindh	35.538	Gas	GE+ST	32.838+2.70	
46	Thal Industries Corporation Limited (for Safina Sugar Mills Limited - Plant I), Chiniot, Punjab	11.00	Bagasse	ST	11.00	
47	Ranipur Sugar Mills (Pvt.) Limited, Khairpur, Sindh	25.50	Bagasse	ST	25.50	
48	Unicol Limited, Mirpur Khas, Sindh	6.60	Bagasse	ST	6.60	
49	Lucky Cement Limited, Lakki Marwat, Khyber Pakhtunkhwa	16.00	Waste Heat Recovery Based TPS	Steam Generators	16.00	
50	Alliance Sugar Mills (Pvt.) Limited, Ghotki, Sindh	13.50	Bagasse	ST	13.50	
51	Habib Sugar Mills Limited, Benazirabad, Sindh	13.50	Bagasse	ST	13.50	
52	Mehran Sugar Mills Limited, Tando Allahyar, Sindh	14.06	Bagasse	ST	14.06	
53	Shahmurad Sugar Mills Limited, Thatta, Sindh	15.25	Bagasse	ST	15.25	
54	Sanghar Sugar Mills Limited, Sanghar, Sindh	13.50	Bagasse	ST	13.50	
55	Mirpurkhas Sugar Mills Limited, Mirpurkhas, Sindh	8.50	Bagasse	ST	8.50	
56	Khairpur Sugar Mills Limited, Khairpur, Sindh	12.00	Bagasse+FO	ST	12.00	
57	Data Hydropower (Pvt.) Limited, Chiniot, Punjab	0.30	Hydel	Run of Canal	0.30	
58	Hytex Energy (Pvt.) Limited, Hyderabad, Sindh	5.00	Coal/Biomass	SI	5.00	
59	NC Electric Company Limited, Kasur, Punjab	46.00	Imported/Local Coal	SI	46.00	
60	Master Power (Pvt.) Limited, Lahore, Punjab	20.00	Imported/Local Coal	SI	20.00	
61	Fazal Paper Mills (Pvt.) Limited, Okara, Punjab	8.00	Biomass/Local Coal	51	8.00	
62	Bismillah Energy (Pvt.) Limited, Sheikhupura, Punjab	6.00	Solid Waste	ST	6.00	
63	Maple Leaf Power Limited, Mianwali, Punjab	40.00	Imported Coal	ST	40.00	
64	Pakistan Atomic Energy Commision, Khushab, Punjab	50.00	Indigenous Coal	ST	25x2	
65	Trident Power GR (Pvt.) Limited, Gujranwala, Punjab	7.50	Hydel	Run of Canal	4x1.875	
66	Jauharabad Sugar Mills Limited, Khushab, Punjab	21.44	Bagasse	ST	21.44	
67	Premier Industrial Chemical Manufacturing	7.00	Biomass	ST	7.00	
	Company (Pvt.) Limited, Sneiknupura, Punjab					
ISOLAT	ted Generation Companies (IGCs)	70.02		СТ	E 20	
1	Engro Polymer and Chemicals Limited, Karachi, Sindh	79.02	HSD+ Gas		5.20	
2	Alloud Power Generation (Put) Limited, Karachi, Sindh	30.95 E 99	FO+Gas Piogas/Cas		23.04+7.11	
5	Lucky Enorgy (Put) Limited Karachi, Sindh	5.00	Biogas/Gas	GE	5.00	
4	Nadeem Power Generation Limited Karachi, Sindh	2 805	Gas	GE	2 805	
6	Shakargani Energy (Pyt) Limited Ibang Punjah	31.50	Bagasse+FO	ST	2.005	
7	Asia Generation (Pvt.) Limited Karachi Sindh	11 10	Gas	GF	11 10	
8	Aquagen (Pvt.) Limited Karachi Sindh	7 357	Gas	GE	7 357	
9	Innovative Energy Solutions Limited, Karachi, Sindh	8.031	Gas	GE	3x2.677	
New	Captive Power Plants (N-CPPs)	0.001	000	0-	0.1011	
1	Dadu Energy (Pvt.) Limited, Dadu, Sindh	49.448	Gas	GE+ST	46.648+2.80	
2	Omni Power (Pvt.) Limited, Tando Muhammad	14.128	Gas	GE+ST	13.328+0.80	
2	Shikarnur Power (Pvt.) Limited Shikarnur, Sindh	17.66	Gas	GF+ST	16 66+1 00	
4	Naudero Energy (Pvt.) Limited Larkana Sindh	17.66	Gas	GF+ST	16.66+2.00	
5	Anoud Textile Mills Limited Jamshoro Sindh	11 70	Gas	GF	11 70	
6	Lucky Cement Limited, Karachi, Sindh	29.73	Gas	GF	29.73	
7	Galaxy Textile Mills Limited Jhang Puniah	13,396	Gas	GF	13,396	
		.5.550		51		

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S.		Installed Cap. (MW)		Capacity (MW)	
No	Name of Company and Location	as per	Fuel Type		
NO.		Licence		Technology	Capacity
8	Thatta Power (Pvt.) Limited, Thatta, Sindh	45.984	Gas	GE+ST	39.984+6.00
0	Hi-Tech Pipe & Engineering Industries (Pvt.)	15.00	Cas	СТ	15.00
9	Limited, Jamshoro, Sindh	15.00	Gas	GI	15.00
Distr	ibuted Generation Plants (DGPs)				
1	FFBL Power Company Limited, Karachi, Sindh	118.00	Coal+Gas	ST	118.00
Short	-Term Independent Power Producers (STIPPs)				
1	Gulf Powergen (Pvt.) Limited, Gujranwala, Punjab	83.84	RFO	RE	83.84
2	Reshma Power Generation (Pvt.) Limited, Kasur, Punjab	96.96	RFO	RE	96.96
Othe	r IPPs	•			
1	The Hub Power Company Limited, Lasbela,	1202.00	E0	ст	2221/4
1	Balochistan*	1292.00	FO	51	52584
2	Kot Addu Power Company Limited, Muzaffargarh, Punjab*	1600.00	Gas+FO+HSD	GT+ST	1021+579
3	K-Energy (Pvt.) Limited, Karachi, Sindh	421.90	Imported Coal	ST	2x210.95
4	Datang Pakistan Karachi Power Generation (Pvt.)	700.00	Imported Cool	ст	2,4250
4	Limited, Karachi, Sindh	700.00	imported Coat	51	2x350
5	Kolachi Portgen (Pvt.) Limited, Karachi, Sindh	460.00	Imported RLNG	GT+ST	310+150
6	ICI Pakistan Limited, Sheikhupura, Punjab	15.00	Imported Coal	ST	15.00
CB = 0	Conventional Boiler DE = Diesel Engines	•	FO = Furnace Oil	GE = Gas E	Engines

ST = Steam Turbines

WT = Wind Turbines

GT = Gas Turbines RE = Reciprocating Engines Note: Shaded areas indicate licenses issued in 2017-18. * Prior to * Prior to 1994 Power Policy Source: National Electric Power Regulatory Authority, Islamabad

TABLE 37-D

List of Public and Private Sector Power Generation Licensees

S. No.	Name of Company	Date of Licence (Issued+Valid Until)	Installed Cap. (MW) as per Licence	Fuel Type	Technology		
Gene	eration Licence Granted to Public Sector C	ompanies					
1	Jamshoro Power Generation Company Limited (GENCO-I)	Issued 01-07-2002 Valid until 30-06-2021	2,344.00*	Gas+RFO +Coal	GTs+STs		
2	Central Power Generation Company Limited (GENCO-II)	Issued 01-07-2002 Valid until 30-06-2017	2,431.7	Gas+RFO	GTs+STs		
3	Northern Power Generation Company Limited (GENCO-III)	Issued 01-07-2002 Valid until 30-06-2027	2,291.65	Gas+RFO	GTs+STs		
4	Lakhra Power Generation Company Limited (GENCO-IV)	Issued 18-02-2005 Valid until 17-02-2020	150.00	Coal+RFO +DO	STs		
Gene	Generation Licence Granted to Private Sector Companies						
1	K-Electric Limited (KEL)	Issued 18-11-2002 Valid until 17-11-2027	1,874.79	Gas+RFO	GTs+STs		

* Include 2x660 MW Coal Power Project under implementation. Source: National Electric Power Regulatory Authority, Islamabad

S.	Name of Company and Location	Installed Capacity (MW)	Fuel	Technolo Capacity	gy-wise y (MW)
INO.		as per Licence	туре	Technology	Capacity
1*	Fauji Kabirwala Power Company Limited, Khanewal, Punjab	170.00	Gas	GT+ST	96+74
2*	TNB Liberty Power Limited, Daharki, Sindh	235.00	Gas	GT+ST	156+79
3*	Habibullah Coastal Power Company (Pvt.) Limited, Sheikh Manda, Balochistan	155.00	Gas	GT+ST	111+29
4*	Uch Power Limited, Naseerabad, Balochistan	586.20	Gas	GT+ST	390+196
5*	Rousch (Pakistan) Power Limited, Khanewal, Punjab	450.00	Gas	GT+ST	304+146
6*	Kohinoor Energy Limited, Raiwind, Punjab	131.44	FO	DE+ST	131.44
7	Lal Pir Power (Pvt.) Limited, Muzaffargarh, Punjab	362.00	FO	ST	362
8	Pak Gen. Power (Pvt.) Limited, Muzaffargarh, Punjab	365.00	FO	ST	365
9	Saba Power Company Limited, Sheikhupura, Punjab	136.00	FO	ST	136
10	Gul Ahmed Energy Limited, Karachi, Sindh	136.17	RFO	DE	15.13x9
11	Tapal Energy (Pvt.) Limited, Karachi, Sindh	126.00	RFO	DE	126
12	Japan Power Limited, Raiwind, Punjab	135.60	RFO	DE	5.65x24
13	Southern Electric Power Company Limited, Lahore, Punjab	117.00	RFO	DE	23.4x5
14	Altern Energy Limited, Fateh Jhang, Punjab	14.00	Gas	GE	14
15	Davis Energen (Pvt.) Limited, Jhang, Punjab	12.16	Gas	GE	3.04x4

TABLE 37-E List of Generation Licensees (IPPs under Power Policy 1994)

* Combined Cycle technology is being used in these plants. Source: National Electric Power Regulatory Authority, Islamabad

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21

Radian Energy Power Generation Company (Pvt.)

Port Qasim Electric Power Company Limited,

Limited, Faisalabad, Punjab

Karachi, Sindh

	List of Generation Licensees	(IPPs under P	ower Policy 2	2002)		
S.	Name of Company and Location	Installed Cap. (MW) as per	Fuel Type	Technology-wise Capacity (MW)		
INO.		Licence		Technology	Capacity	
1	DHA Cogen Limited, Karachi, Sindh	94.00	Gas	GT+ST	67+27	
2	Star Power Generation Limited, Daharki, Sindh	133.515	Gas	GT+ST	88.244+45.271	
3	Orient Power Company (Pvt.) Limited, Balloki, Punjab	225.00	Gas	GT+ST	151+74	
4	Saif Power Limited, Sahiwal, Punjab	225.00	Gas+HSD	GT+ST	152+73	
5	Sapphire Electric Power Company Limited, Sheikhupura, Punjab	235.00	Gas+HSD	GT+ST	152+83	
6	Attock Gen Limited, Rawalpindi, Punjab	165.285	FO+HSD	DG+ST	153.275+12.01	
7	Halmore Power Generation Company (Pvt.) Limited, Bhikki, Punjab	225.00	Gas+HSD	GT+ST	150+75	
8	Foundation Power Company (Daharki) Limited, Daharki, Sindh	179.05	Gas+HSD	GT+ST	114.9+64.15	
9	Eastern Power Company Limited, Pasroor, Punjab	152.475	FO+HSD	RE+ST	143.975+8.5	
10	Atlas Power (Pvt.) Limited, Sheikhupura, Punjab	224.35	RFO+LDO	RE+ST	207.9+16.45	
11	Gujranwala Energy Limited, Gujranwala, Punjab	201.451	HSFO+HSD	RE+ST	187.836+13.615	
12	Engro Power Gen. Qadirpur Limited, Qadirpur, Sindh	226.52	Gas+HSD	GT+ST	126.57+99.95	
13	Nishat Chunian Power Limited, Kasur, Punjab	202.179	RFO+HSD	RE+ST	187.836+14.343	
14	Nishat Power Limited, Kasur, Punjab	202.179	RFO+HSD	RE+ST	187.836+14.343	
15	Intergen (Pvt.) Limited, Lachi, Kohat, Khyber Pakhtunkhwa	165.285	HSFO+HSD	RE+ST	153.684+11.60	
16	The Hub Power Company Limited (Narowal Project), Narowal, Punjab	224.79	RFO+LDO	RE+ST	207.9+16.89	
17	Liberty Power Tech Limited, Faisalabad, Punjab	202.179	RFO+HSD	RE+ST	187.836+14.343	
18	Grange Power Limited, Pakpattan, Punjab	163.353	Gas	GT+ST	109+54.353	
19	Uch-II Power (Pvt.) Limited, Naseerabad, Balochistan	404.00	Gas	GT+ST	267.54+136.46	

164.368

1320.00

RFO+LFO

Imported

Coal

RE+ST

ST+CB

TABLE 37-F

153.684+10.684

660x2

S.	Name of Company and Location	Installed Cap. (MW) as per	Fuel Type	Technology-wise Capacity (MW)	
NO.		Licence		Technology	Capacity
22	Engro Powergen Thar (Pvt.) Limited, Tharparkar, Sindh	660.00	Indigenous Coal	ST+CB	330x2
23	Huaneng Shandong Ruyi (Pakistan) Energy (Pvt.) Limited, Sahiwal, Punjab	1320.00	Imported Coal	ST+CB	660x2
24	Sindh Nooriabad Power Company (Pvt.) Limited, Jamshoro, Sindh	52.10	Gas	GE+ST	9.72x5+3.50
25	Sindh Nooriabad Power Company Phase-II (Pvt.) Limited, Jamshoro, Sindh	52.10	Gas	GE+ST	9.72x5+3.50
26	Lucky Electric Power Company Limited, Karachi, Sindh	660.00	Thar Coal	ST+CB	660.00
27	Thar Coal Block-I Power Generation Company (Pvt.) Limited, Tharparkar, Sindh	1320.00	Thar Coal	ST+CB	660x2

Source: National Electric Power Regulatory Authority, Islamabad

TABLE 37-GList of Generation Licensees (IPPs under Power Policy 2015)

S.	Name of Company and Location	Installed Cap.	Fuel Type	Technology-wise Capacity (MW)	
No.	Name of company and Location	Licence	ruerrype	Technology	Capacity
1	Quaid-e-Azam Thermal Power (Pvt.) Limited, Sheikhupura, Punjab	1230.90	RLNG	GT+ST	416x2+ 398.90
2	China Power Hub Generation Company (Pvt.) Limited, Lasbella, Balochistan	1320.00	Imported Coal	ST	660x2
3	National Power Parks Management Company (Pvt.) Limited (Balloki Power Project), Kasur, Punjab	1275.50	RLNG	GT+ST	427.5x2+ 420.5
4	National Power Parks Management Company (Pvt.) Limited (Haveli Bahadur Shah Power Project), Jhang, Punjab	1276.86	RLNG	GT+ST	428.059x2 +420.74
5	ThalNova Power Thar (Pvt.) Limited, Tharparkar, Sindh	330.00	Thar Coal	ST	330.00
6	Thar Energy Limited, Tharparkar, Sindh	330.00	Thar Coal	ST	330.00
7	Punjab Thermal Power (Pvt.) Limited, Jhang, Punjab	1278.70	RLNG	GT+ST	420x2+438.7

Note: Shaded areas indicate licenses issued in 2017-18.

Source: National Electric Power Regulatory Authority, Islamabad

TABLE 37-H DISCO-wise Details of Net-Metering Licensees

S.	DISCO	No. o	No. of Licence issued			led Capacity	/ (kW)
No.	DISCO	2015-16	2016-17	2017-18	2015-16	2016-17	2017-18
1	Peshawar Electric Supply Company Limited	-	-	2	-	-	37.56
2	Tribal Areas Electricity Supply Company Limited	-	-	-	-	-	-
3	Islamabad Electric Supply Company Limited	2	49	114	1,020.00	1,008.96	1,732.81
4	Gujranwala Electric Power Company Limited	-	3	31	-	11.00	1,190.37
5	Lahore Electric Supply Company Limited	-	36	142	-	468.20	3,204.43
6	Faisalabad Electric Supply Company Limited	-	2	13	-	305.00	217.60
7	Multan Electric Power Company Limited	-	10	7	-	470.57	251.96
8	Hyderabad Electric Supply Company Limited	-	-	-	-	-	-
9	Sukkur Electric Power Company Limited	-	-	-	-	-	-
10	Quetta Electric Supply Company Limited	-	-	-	-	-	-
11	K-Electric Limited	-	-	28	-	-	288.40
12	Bahria Town (Pvt.) Limited	-	6	13	-	52.95	84.79
	Total	2	106	350	1,020.00	2,316.68	7,007.91

Source: National Electric Power Regulatory Authority, Islamabad

S. No.	Name of Company	Number of Consumers (as on 30 th June 2018)	Date of Licence	Licence Valid Until
Tran	smission Licence Granted to Public Companies	50 June, 2010)	135464	
1	National Transmission and Despatch Company Limited, Lahore, Punjab		31-12-2002	30-12-2032
Trans	smission Licence Granted to Private Companies			
1	K-Electric Limited, Karachi, Sindh		11-06-2010	10-06-2030
Spec	ial Purpose Transmission Licence (SPTL) Granted to Private C	ompanies		
1	Fatima Transmission Company Limited, Muzaffargarh, Punjab		28-08-2015	27-08-2045
2	Sindh Transmission and Dispatch Company (Pvt.) Limited, Nooriabad, Sindh		17-12-2015	16-12-2045
3	Pak Matiari-Lahore Transmission Company (Pvt.) Limited		19-02-2018	28-02-2046
Distr	ibution Licence Granted to Public Sector Companies			
1	Peshawar Electric Supply Company Limited, Peshawar, KPK	3,330,907	30-04-2002	29-04-2022
2	Tribal Areas Electricity Supply Company Limited, Peshawar, KPK	442,401	12-08-2013	11-08-2033
3	Islamabad Electric Supply Company Limited, Islamabad	2,837,238	02-11-2001	01-11-2021
4	Gujranwala Electric Power Company Limited, Gujranwala, Punjab	3,326,274	23-04-2002	22-04-2022
5	Lahore Electric Supply Company Limited, Lahore, Punjab	4,598,784	01-04-2002	31-03-2022
6	Faisalabad Electric Supply Company Limited, Faisalabad, Punjab	3,953,132	02-03-2002	01-03-2022
7	Multan Electric Power Company Limited, Multan, Punjab	6,072,783	25-04-2002	24-04-2022
8	Hyderabad Electric Supply Company Limited, Hyderabad, Sindh	1,080,714	23-04-2002	22-04-2022
9	Sukkur Electric Power Company Limited, Sukkur, Sindh	745,308	18-08-2011	17-08-2031
10	Quetta Electric Supply Company Limited, Quetta, Balochistan	609,004	30-04-2002	29-04-2022
Distr	ibution Licence Granted to Private Sector Companies			
1	K-Electric Limited, Karachi, Sindh	2,583,435	21-07-2003	20-07-2023
Distr	ibution Licence Granted to Housing Colonies			
1	Bahria Town (Pvt.) Limited (Rawalpindi/Islamabad)	26,779	24-11-2010	23-11-2030
2	Defence Housing Authority, Phase XII (EME Sector), Lahore, Punjab		26-12-2016	25-12-2036
Distr	ibution Licence Granted to Small Power Producers			
1	Monnoo Energy Limited, Sheikhupura, Punjab	3	20-10-2006	31-12-2031
2	Sapphire Power Generation Limited, Sheikhupura, Punjab	7	20-10-2006	12-07-2040
3	Sitara Energy Limited, Faisalabad, Punjab	29	20-10-2006	LPM in process.
4	Gulistan Power Gen. Limited, Sheikhupura, Punjab	4	20-10-2006	15-11-2016
5	Mahmood Textile Mills Limited, Muzaffargarh, Punjab	1	14-11-2006	21-10-2016
6	Kohinoor Mills Limited, Kasur, Punjab	1	14-11-2006	LPM in process.
7	Quetta Textile Mills Limited, Kotri, Sindh	3	14-11-2006	30-01-2037
8	Ibrahim Fibres (Pvt.) Limited, Faisalabad, Punjab	3	22-07-2008	30-12-2021
9	Crescent Powertec Limited, Sheikhupura, Punjab	3	18-12-2008	21-10-2016
Distr	ibution Licence Granted to Captive Power Producers	1		
1	Engro Chemical Pakistan Limited, Ghotki, Sindh	Self Consumption	22-07-2009	21-07-2029

TABLE 37-I List of Transmission and Distribution Licensees

Note: Shaded areas indicate licenses issued in 2017-18. Source: National Electric Power Regulatory Authority, Islamabad

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ELECTRICITY TRANSMISSION

12.1 GENERAL

In Pakistan, there are two companies which are, presently engaged, in the business of electric power transmission under Section 17 of the NEPRA Act. One is NTDC and the other is K-Electric Limited. NTDC is the National Grid Company of Pakistan and is exclusively responsible for construction, operation, maintenance of 500 kV and 220 kV Grid Stations and Power Transmission Lines in the country except for the area served by K-Electric. NTDC is a public sector company and came into existence as a result of restructuring of WAPDA in 1998 and then obtained a transmission licence by NEPRA in 2002. At present, NTDC owns a network of 500 kV, 220 kV and some 132 kV (interconnections at CDPs) transmission lines and grid stations in its network.

Besides NTDC, the other company which is engaged in electric power transmission business is K-Electric. K-Electric is a vertically integrated company operating in private sector since 2005. Earlier the company was in public sector and responsible for generation, transmission and distribution of electric power in its service area. The transmission network of K-Electric is connected to the National Grid (NTDC system) by 220 kV and 132 kV links.

In addition to above, under Section 19 of the NEPRA Act, Special Purpose Transmission Licence granted to the private companies i.e. Fatima Transmission Company Limited and Sindh Transmission and Dispatch Company (Pvt.) Limited.

12.2 TRANSMISSION LINES AND GRID STATIONS WITH NTDC

The interconnected transmission system of NTDC comprises of 500 kV and 220 kV transmission lines and grid stations. The status of transmission lines and grid stations, at the end of fiscal years from 2014 to 2018, owned and operated by NTDC are mentioned in the following table:

A:Transmission Lines								
As on 30 th June	500 kV		22	220 kV		Total Transmission Lines and No. of Circuits		
	No. of Circuits	500 kV TL (km)	No. of Circuits 220 kV TL (km)		No. of Circuits	Total km		
2014	30	5,077	88	8,547	118	13,624		
2015	30	5,077	93	9,624	123	14,701		
2016	32	5,113	96	9,632	128	14,745		
2017	36	5,127	111	10,063	147	15,190		
2018	45	5,618	122	10,478	167	16,096		
B:Grid Static	ons							
As on 30 th June	500/2	220 kV	220/	132 kV	Total No. of Grid Stations and MVA Capacity			
	No. of Grid	500/220 kV	No. of Grid	220/132 kV	Total No. of Grid	Total MVA		
	Station	MVA Capacity	Station	MVA Capacity	Station	Capacity		
2014	12	15,750	31	19,174	43	34,924		
2015	13	16,950	35	22,854	48	39,804		
2016	14	18,150	36	24,040	50	42,190		
2017	14	18,150	38	25,610	52	43,760		
2018	16	20,850	42	28,860	58	49,710		

TABLE 38					
Transmission Lines	and	Grid :	Stations	with NTDC	

Source: NTDC

12.3 TRANSMISSION LOSSES

The history of transmission losses of NTDC system for the years 2013-14 to 2017-18 is shown in the following table:

Unit Received, Delivered and Transmission Losses in NTDC System (500/220 kV) (GWh)								
	Unit	2013-14	2014-15	2015-16	2016-17	2017-18		
Unit Received by NTDC	GWh	95,566.00	97,474.00	101,150.00	106,798.00	120,062.00		
Unit Delivered by NTDC	GWh	92,868.00	94,909.00	98,550.00	104,331.00	117,139.00		
Unit Lossos (Transmission)	GWh	2,698.00	2,565.00	2,600.00	2,467.00	2,923.00		
	%	2.82	2.63	2.57	2.31	2.43		

TABLE 39

Source: NTDC

12.4 UTILIZATION OF TRANSMISSION LINES AND POWER TRANSFORMERS

Optimum utilization of transmission lines and power transformers in any electric power system is important and has a very significant impact both technically as well as financially. The position of utilization of transmission lines in the NTDC's network for the years 2013-14 to 2017-18 is mentioned in following table:

TABLE 40							
Loading Position of	Transmissio	n Lines and F	Power Transf	ormers in N	FDC System		
A: Loading Position of Transmission	Lines						
		2013-14	2014-15	2015-16	2016-17	2017-18	
Overloaded Transmission	500 kV	0	2	2	2	9	
Lines/Circuits (Nos.) (>80%)	220 kV	25	32	16	19	34	
Underutilized Transmission	500 kV	34	30	33	34	39	
Lines/Circuits (Nos.) (<30%)	220 kV	95	74	96	95	101	
B: Loading Position of Power Transf	ormers						
		2013-14	2014-15	2015-16	2016-17	2017-18	
Overloaded Power Transformers	500 kV	5	5	4	14	18	
(Nos.) (>80%)	220 kV	63	47	45	63	50	
Underutilized Power Transformers	500 kV	26	22	25	18	17	
(Nos.) (<30%)	220 kV	55	43	63	69	63	

Source: NTDC

12.5 TRANSMISSION LINES TRIPPING IN PEPCO SYSTEM

The tripping records of transmission lines in PEPCO system for fiscal years from 2013-14 to 2017-18 are given in the following table:

Transmission Lines Tripping in PEPCO System								
Veer	Description	Planned	Outages	Forced Outages				
rear	Description	500 kV	220 kV	500 kV	220 kV			
	No. of Outages	344	665	90	265			
2013-14	Total duration in minutes	165426	264682	113460	101493			
	Maximum duration of any single outage (Minutes)	14584	9566	41771	37339			
	No. of Outages	469	777	76	250			
2014-15	Total duration in minutes	267263	230783	85656	727395			
	Maximum duration of any single outage (Minutes)	3729	1990	12347	244003			
	No. of Outages	559	886	82	287			
2015-16	Total duration in minutes	275191	406952	1885661	243431			
	Maximum duration of any single outage (Minutes)	10289	1057	133045	61028			
	No. of Outages	653	1114	122	336			
2016-17	Total duration in minutes	286623	498620	29463	141619			
	Maximum duration of any single outage (Minutes)	16521	16313	3894	13854			

 TABLE 41

 Transmission Lines Tripping in PEPCO System

Veer	Description	Planned	Outages	Forced Outages	
fear	Description	500 kV	220 kV	500 kV	220 kV
	No. of Outages	633	1598	116	389
2017-18	Total duration in minutes	305750	717250	42358	236585
	Maximum duration of any single outage (Minutes)	23000	28557	5101	40436

Source: NTDC

12.6 LOADING POSITION OF NTDC'S 500 KV AND 220 KV GRID STATIONS

The electricity transmission infrastructure is the backbone of the power sector, as it enables a reliable, stable and efficient supply of power to consumers. Thus, an adequate and well-interconnected transmission network is vital for the development of the overall sector. The following tables shows the loading position of power transformers installed at 500 kV and 220 kV grid stations of NTDC for FY 2017-18:

Over	loading of 500						., 2010)
Region	Name of Grid Station	Auto and Power T/F	Voltage Level	Capacity (MVA)	Capacity (Ampere)	Load (Ampere)	Overload (above 80%)
		T-1	500/220	450	1125	1060	94.22
		T-2	500/220	450	1125	1060	94.22
	Davuat	T-3	500/220	450	1125	1060	94.22
	Rawat	T-4	220/132	250	1093	1020	93.32
		T-5	220/132	250	1093	1020	93.32
		T-6	220/132	250	1093	1020	93.32
Islamabad		T-1	500/220	450	1180	990	83.90
		T-2	500/220	450	1180	990	83.90
	Chuith	T-3	220/132	250	1093	980	89.66
	Sneikn	T-4	220/132	250	1093	980	89.66
	Munammadi	T-5	220/132	250	1093	980	89.66
		T-8	220/132	250	1093	980	89.66
		T-9	500/220	450	1180	990	83.90
		T-1	500/220	600	1575	1530	97.14
	Nokhar	T-2	500/220	600	1575	1530	97.14
		T-4	220/132	160	700	650	92.86
		T-5	220/132	160	700	650	92.86
		T-6	220/132	160	700	650	92.86
		T-1	500/220	450	1181	1129	95.60
	Catti	T-2	500/220	450	1181	1153	97.63
	Galli	T-3	500/220	450	1181	1104	93.48
		T-4	500/220	450	1181	1104	93.48
		TB-1	500/220	600	1575	1570	99.68
		TB-2	500/220	600	1575	1570	99.68
Lahore		TB-3	500/220	600	1575	1570	99.68
	Shoikhupura	TB-4	500/220	600	1575	1570	99.68
	Sheikhupula	T-5	220/132	160	700	575	82.14
		T-6	220/132	160	700	640	91.43
		T-7	220/131	160	700	690	98.57
		T-8	220/132	160	700	565	80.71
		T-1	500/220	600	1575	1530	97.14
	107	T-2	500/220	600	1575	1530	97.14
	Voucafivala	T-3	220/132	160	700	610	87.14
	TOUSalwald	T-4	220/132	160	700	610	87.14
		T-5	220/132	160	700	610	87.14
E C		T-6	220/132	160	700	610	87.14

Table 42-A Overloading of 500 kV and 220 kV Power Transformers at 500 kV Grid Stations (June, 2018

Region	Name of Grid Station	Auto and Power T/F	Voltage Level	Capacity (MVA)	Capacity (Ampere)	Load (Ampere)	Overload (above 80%)
		TR-1	525/231/22	450	1125	1132	100.62
		TR-2	525/231/22	450	1125	1132	100.62
N. 4. 1.	Multan	TR-3	220/132	160	700	670	95.71
Mullan		TR-4	220/132	160	700	670	95.71
		TR-5	220/132	160	700	670	95.71
	M/Garh	ATB-2	525/231/23	600	1500	1280	85.33
	Shikarpur	T-1	220/132	160	700	620	88.57
Hyderabad		T-2	220/132	160	700	620	88.57
		T-3	220/132	160	700	620	88.57

Source: NTDC

Overl	oading of 220 l	دV and 132 k\	Power Trans	formers at 22	20 kV Grid St	ations (June	, 2018)
Region	Name of Grid	Auto and	Voltage	Capacity	Capacity	Load	Overload
Region	Station	Power T/F	Level	(MVA)	(Ampere)	(Ampere)	(above 80%)
		T-1	220/132	250	1093	1050	96.07
		T-2	220/132	250	1093	1050	96.07
	Mardan	T-3	220/132	250	1093	1040	95.15
		T-4	132/11	40	2008	1870	93.13
		T-5	132/11	40	2008	1980	98.61
	Daud Khail	T-1	220/132	160	700	573	81.86
		T-2	220/132	160	700	573	81.86
		T-1	220/132	160	700	610	87.14
		T-2	220/132	160	700	610	87.14
lalamahad	Bannu	T-3	132/11	20/26	1305	1300	99.62
Islamabad		T-4	132/11	40	2008	1740	86.65
		T-5	220/132	160	700	610	87.14
	Sang Jani	T-1	220/132	160	700	660	94.29
		T-2	220/132	160	700	660	94.29
		T-3	220/132	160	700	660	94.29
		T-4	220/132	160	700	660	94.29
		T-5	132/11	20/26	1305	1055	80.84
	University	T-1	220/132	250	1093	970	88.75
		T-5	132/11	20/26	1305	1368	104.83
	Shahi Bagh	T-5	132/11	10/13	653	582	89.13
	Chichtian	T-1	220/132	160	700	641	91.57
	Chishtian	T-2	220/132	160	700	641	91.57
	Muzzafar	T-1	220/132	160	700	675	96.43
	Garh	T-2	220/132	160	700	675	96.43
		T-1	220/132	160	700	662	94.57
	Dahamalaria	T-2	220/132	250	1093	990	90.58
Multan	Banawalpur	T-3	220/132	250	1093	990	90.58
		T-4	132/11	20/26	1305	1196	91.65
		T-1	220/132	125/160	700	700	100.00
	Vehari	T-2	220/132	125/160	700	700	100.00
		T-3	220/132	125/160	700	710	101.43
		T-1	220/132	160	700	664	94.86
	Kassowal	T-2	220/132	160	700	664	94.86
		T-1	220/132	160	700	600	85.71
Hyderabad	Hala Road	T-2	220/132	160	700	600	85.71
		T-5	132/11	20/26	1305	1100	84.29

Table 42-B

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Pagian	Name of Grid	Auto and	Voltage	Capacity	Capacity	Load	Overload
Region	Station	Power T/F	Level	(MVA)	(Ampere)	(Ampere)	(above 80%)
		T-1	220/132	160	700	657	93.86
		T-2	220/132	160	700	633	90.43
	Jaranwala	T-3	220/132	160	700	628	89.71
		T-4	220/132	160	700	680	97.14
		T-6	132/11.5	20/26	1305	1185	90.80
	Commundri	T-1	220/132	160	700	590	84.29
	Bood	T-2	220/132	160	700	620	88.57
	NUdu	T-3	220/132	160	700	620	88.57
		T-1	220/132	160	700	645	92.14
	Ludewala	T-2	220/132	160	700	645	92.14
		T-3	220/132	250	1093	970	88.74
	Bandala	T-1	220/132	250	1093	900	82.34
		T-1	220/132	250	1093	1050	96.06
	TT Singh	T-2	220/132	160	700	620	88.57
		T-3	220/132	160	700	620	88.57
		T-1	220/132	160	700	670	95.71
		T-2	220/132	160	700	590	84.29
	Ghakkar	T-3	220/132	160	700	700	100.00
		T-5	132/11.5	26	1305	1270	97.32
		T-6	132/11.5	26	1305	1250	95.79
	Kala Shah Kaku	T-7	132/11.5	26	1305	1140	87.36
Lahore		T-1	220/132	250	1093	1075	98.35
		T-2	220/132	250	1093	1130	103.39
	NKLP LHR	T-3	220/132	250	1093	1130	103.39
		T-4	132/11.5	40	2008	1610	80.18
		T-5	132/11.5	40	2008	1930	96.12
		T-6	132/11.5	40	2008	1825	90.89
		T-1	220/132	250	1093	940	86.00
	Ravi LHR	T-2	220/132	250	1093	900	82.34
		T-3	220/132	250	1093	900	82.34
		T-1	220/132	160	700	700	100.00
	Sarfaraz	T-2	220/132	160	700	700	100.00
	Nagar	T-3	220/132	160	700	700	100.00
		T-6	220/132	160	700	700	100.00
	Sialkot	T-4	132/11.5	13	653	625	95.71
	Slaikot	T-5	132/11.5	26	1305	1075	82.38
		T-1	220/132	160	700	620	88.57
		T-2	220/132	160	700	620	88.57
		T-3	220/132	160	700	620	88.57
		T-4	132/11.5	40	2008	1850	92.13
		T-5	132/11.5	40	2008	1840	91.63
		T-6	132/11.5	40	2008	1915	95.37
	GZR	T-1	220/132	250	1093	890	81.43
	Sibbi	T-3	132/11	20/26	1305	1260	96.55
Quatta	5000	T-4	132/11	20/26	1305	1260	96.55
Quetta	Quetta	T-1	220/132	160	700	560	80.00
	Industrial-II	T-2	220/132	160	700	560	80.00

Source: NTDC

17/17/

A. New Grid	Station								
Deried of		500	0/220 kV Gri	ds		220	/132 kV Grids		
Period of	Nec	MVA	Expected	Estimated Cost	Nec	MVA	Expected	Estimated Cost	
Report	INOS.	Capacity	COD	(Rs. Million)	INOS.	Capacity	COD	(Rs. Million)	
2018-19	-	-	-	-	4	2,250	2018-19	15,344.00	
2019-20	-	-	-	-	8	4,820	2019-20	30,750.00	
B. Extension	ı								
2018-19	1	450	2018-19	5,445.00	1	250	2018-19	318.00	
2019-20	2	1,050	2019-20	2,852.00	11	2,140	2019-20	2,780.00	
C. Addition	/Reinfor	cement of T	ransformers	at Overloaded Grid	Stations				
2018-19	1	300	2018-19	927.00	2	270	2018-19	644.00	
2019-20	-	-	-	-	19	4,656	2019-20	11,246.00	
Courses NTDC	•								

TABLE 43 Grid Station Expansion Plan of NTDC

Source: NTDC

12.7 INVESTMENT PLAN - NTDC SYSTEM

Being National Grid Company of the country, NTDC is responsible for overall reliability, planning and coordination of the electricity transmission in Pakistan except, the area under K-Electric. Further, NTDC is also responsible to provide interconnection arrangement to evacuate power from up-coming power projects in the country. To discharge its responsibility NTDC has prepared an investment plan for improvement of its transmission network and grid stations. The following table shows the Grid Stations and Transmission Lines Expansion Plans of NTDC:

c		Transmis	sion Lines	Expected	Estimated
S. No	Name of Project	Voltage	Line Length	Completion	Cost
NU.		Level (kV)	(km)	Date	(Million Rs.)
1	T/L 3 rd Circuit Jamshoro-Moro-Dadu to RYK	500	600	March, 2019	37,234.33
2	T/L for dispersal of power from Port Qasim PP (1320 MW) to Matiari (Phase-II)	500	118	March, 2019	14,163.00
3	Replacement of existing 220 kV Tarbela-Burhan-ISPR D/C T/L	220	62.5	June, 2019	2,326.00
4	D/C T/L from HUBCO Coal Fired PP to Jamshoro	500	180	September, 2019	16,500.00
5	T/L for dispersal of power from Guddu PP (747 MW)	500	266	December, 2019	7,873.72
6	T/L from DI Khan-Zhob along with 220 kV Zhob Substation	220	220	2019-20	6,878.00
7	Mirpur Khas G/S and Associated T/L	220	70	2019-20	4,153.00
8	Construction of New 220 kV Guddu-Sibbi T/L	220	360	2019-20	8,624.00

 TABLE 44

 Power Sector Investment Plan for NTDC Transmission Lines (as per approved PC-I)

Source: NTDC

TABLE 45 Interconnection Arrangement to Evacuate Power from up-coming (Public and Private Sector) Power Projects

S. No.	Name of Power Project	Plant Cap. (MW)	Expected COD	Proposed Transmission Scheme
1	Guddu Power Plant	747	December, 2018	500 kV D/C T/L from Guddu to Muzaffargarh (276 km)
2	Balloki Power Plant	1200	December, 2018	500 kV D/C T/L from Balloki PP to 500 kV Lahore South G/S (30 km)
3	Bin Qasim Power Plant (Phase-II)	1320	December, 2018	500 kV D/C T/L from Bin Qasim PP to 500 kV Matiari Switching Station (180 km)
4	Neelum-Jhelum Hydropower Project	969	February, 2019	500 kV D/C T/L Neelum-Jhelum to Domeli (145 km) 500 kV D/C T/L Domeli to Gujranwala (130 km)

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S. No.	Name of Power Project	Plant Cap. (MW)	Expected COD	Proposed Transmission Scheme
5	HUBCO Power Plant	1320	June, 2019	500 kV D/C T/L from HUB PPP to 500 kV Matiari Switching Station (220 km)
6	Evacuation of Power from K2/K3 Nuclear Power Plants	116	2019-20	500 kV D/C T/L from K2/K3 for looping In/Out of proposed HUBCO-Matiari S/C T/L (14 km) 500 kV D/C T/L from K2/K3 for looping In/Out of proposed Port Qasim CFPP-Matiari S/C T/L (102 km)
7	Wind Power Plants at Jhimpir Clusters	1224	2019-20	220 kV D/C T/L for In/Out of 220 kV Jamshoro-KDA D/C at Jhimpir-II (5+5 km) 220 kV D/C T/L for In/Out of 220 kV Jhimpir-I-Gharo S/C at Jhimpir-II (25 km) 132 kV D/C T/L for Interconnection of Wind PP (220 km)

Source: NTDC

12.8 TRANSMISSION LINES AND GRID STATIONS WITH K-ELECTRIC

The statistics of transmission lines and grid stations in respect of K-Electric for fiscal years from 2013-14 to 2017-18 are given in the following tables:

F 40

	I ABLE 40										
	Transmission Lines and Grid Stations with K-Electric Limited										
2013-14 2014-15 2015-16 2016-17								201	7-18		
Length of Tran	smission Li	nes in KE	L (km)								
Oversite and	220 kV	32	23	32	323		23	32	23	323	
Uvernead	132 kV	6	11	6	11	6	11	6	13	6	14
Luies	66 kV	14	49	14	49	14	49	14	19	1	49
Underground	220 kV	1	5	1	15		5	1	5	1	5
Linos	132 kV	15	50	1:	151		51	153		153	
Luies	66 kV	()	0		1		1		1	
Number of Gri	d Stations i	n KEL Tra	nsmissio	n System							
		201	3-14	201	4-15	201	5-16	201	6-17	201	7-18
		No.	MVA	No.	MVA	No.	MVA	No.	MVA	No.	MVA
KEL's Owned	220 kV	7	3000	7	3000	7	3000	7	3000	7	3000
Grid Stations	132 kV	53	4679	54	4732	54	5131	54	5196	54	5550
	66 kV	3	60	3	69	3	69	3	69	3	69
Consumers	220 kV	1	80	1	80	1	80	1	80	1	80
Owned	132 kV	9	452	9	452	9	452	9	452	9	512
Grid Stations	66 kV	0	0	0	0	0	0	0	0	0	0
Total No. of Grid Stations		73	8271	74	8333	74	8732	74	8797	74	9211

Source: KEL

IABLE 47							
	A. Amount Injected to Reinforce/Expand 220 kV and 132 kV						
	Transmission S	System of K-E	lectric Limite	ed (Million Rs.)		
Description		2016-17		2017-18			
Description	FC	LC	Total	FC	LC	Total	
Grid Stations	-	-	3,009.00	6,655.00	1,761.00	8,416.00	
Transmission	-	-	1,740.00	4,455.00	1,897.00	6,352.00	
SCADA	-	-	86.00	618.00	124.00	742.00	
Reinforcement	-	-	753.00	7,167.00	2,063.00	9,230.00	
Total	-	-	5,588.00	18,895.00	5,845.00	24,740.00	
	B. Inve	stment Plan i	n Transmissi	on Line			
	(220 kV and 13	2 kV) of K-Ele	ectric Limited	I (Million US\$)	*		
Description		2018-19			2019-20		
Description	FC	LC	Total	FC	LC	Total	
Grid Stations	17.69	16.39	34.08	25.27	14.27	39.54	
Transmission	41.94	54.34	96.28	32.35	28.17	60.52	
SCADA	6.81	6.68	13.49	0.50	1.14	1.64	
Reinforcement	44.87	57.32	102.19	12.92	9.11	22.03	
Total	111.31	134.73	246.04	71.04	52.69	123.73	
* These are estimates and are subject to change							

* These are estimates and are subject to change. FC: Foreign Currency LC: Local Currency Source: KEL

12.9 TRANSMISSION LINES TRIPPING IN K-ELECTRIC SYSTEM

The tripping records of transmission lines in K-Electric system for fiscal years from 2013-14 to 2017-18 are given in the following table:

	Transmission Lines Tripping in K-Electric Limited System									
Vear	Description	Planned	Outages	Forced	Forced Outages					
Teal	Description	220 kV	132 kV	220 kV	132 kV					
	No. of Outages	252	660	79	359					
2013-14	Total duration in minutes	99767	219884	21423	85754					
	Maximum duration of any single outage (Minutes)	1266	1081	1807	4368					
	No. of Outages	0	12	0	39					
2014-15	Total duration in minutes	0	3662	0	5190					
	Maximum duration of any single outage (Minutes)	0	849	0	631					
	No. of Outages	0	5	0	25					
2015-16	Total duration in minutes	0	1034	0	4125					
	Maximum duration of any single outage (Minutes)	0	607	0	730					
	No. of Outages	0	9	0	45					
2016-17	Total duration in minutes	0	5271	0	8792					
	Maximum duration of any single outage (Minutes)	0	1315	0	970					
2017-18	No. of Outages	0	7	0	26					
	Total duration in minutes	0	4855	0	2451					
	Maximum duration of any single outage (Minutes)	0	2320	0	362					

TABLE 48 ransmission Lines Tripping in K-Electric Limited System

Source: KEL

= = = = = = State of Industry Report 2018

ELECTRICITY DISTRIBUTION

13.1 GENERAL

Presently there are ten distribution companies in public sector, which are distributing electric power to endconsumers in Pakistan except the area served by K-Electric. In the area of Karachi city and its suburbs, K-Electric is solely responsible for distribution of electric power to end-consumers under a separate distribution licence granted by NEPRA. In addition to ten public sector Distribution Companies, one private sector Distribution Company i.e. K-Electric and two distribution licenses to Housing Colonies, NEPRA has granted nine distribution licenses to Small Power Producers and one distribution licence to Captive Power Producer for supply of electric power to designated Bulk Power Consumers.

S. No.	Name of Company	Number of Consumers (as on 30 th June, 2018)	Date of Licence Issued	Licence Valid Until
Distr	ibution Companies working in Public Sector	·		
1	Peshawar Electric Supply Company Limited, Peshawar, Khyber Pakhtunkhwa	3,330,907	30-04-2002	29-04-2022
2	Tribal Areas Electricity Supply Company Limited, Peshawar, Khyber Pakhtunkhwa	442,401	12-08-2013	11-08-2033
3	Islamabad Electric Supply Company Limited, Islamabad	2,837,238	02-11-2001	01-11-2021
4	Gujranwala Electric Power Company Limited, Gujranwala, Punjab	3,326,274	23-04-2002	22-04-2022
5	Lahore Electric Supply Company Limited, Lahore, Punjab	4,598,784	01-04-2002	31-03-2022
6	Faisalabad Electric Supply Company Limited, Faisalabad, Punjab	3,953,132	02-03-2002	01-03-2022
7	Multan Electric Power Company Limited, Multan, Punjab	6,072,783	25-04-2002	24-04-2022
8	Hyderabad Electric Supply Company Limited, Hyderabad, Sindh	1,080,714	23-04-2002	22-04-2022
9	Sukkur Electric Power Company Limited, Sukkur, Sindh	745,308	18-08-2011	17-08-2031
10	Quetta Electric Supply Company Limited, Quetta, Balochistan	609,004	30-04-2002	29-04-2022
Distr	ibution Companies working in Private Sector			
1	K-Electric Limited, Karachi, Sindh	2,583,435	21-07-2003	20-07-2023
Distr	ibution Licence Granted to Housing Colonies			
1	Bahria Town (Pvt.) Limited (Rawalpindi/Islamabad)	26,779	24-11-2010	23-11-2030
2	Defence Housing Authority, Phase XII (EME Sector), Lahore, Punjab		26-12-2016	25-12-2036
Distr	ibution Licence Granted to Small Power Producers	-		
1	Monnoo Energy Limited, Sheikhupura, Punjab	3	20-10-2006	31-12-2031
2	Sapphire Power Generation Limited, Sheikhupura, Punjab	7	20-10-2006	12-07-2040
3	Sitara Energy Limited, Faisalabad, Punjab	29	20-10-2006	LPM in process.
4	Gulistan Power Gen. Limited, Sheikhupura, Punjab	4	20-10-2006	15-11-2016
5	Mahmood Textile Mills Limited, Muzaffargarh, Punjab	1	14-11-2006	21-10-2016
6	Kohinoor Mills Limited, Kasur, Punjab	1	14-11-2006	LPM in process.
7	Quetta Textile Mills Limited, Kotri, Sindh	3	14-11-2006	30-01-2037
8	Ibrahim Fibres (Pvt.) Limited, Faisalabad, Punjab	3	22-07-2008	30-12-2021
9	Crescent Powertec Limited, Sheikhupura, Punjab	3	18-12-2008	21-10-2016
Distr	ibution Licence Granted to Captive Power Producers		00.07.5555	
1	Engro Chemical Pakistan Limited, Ghotki, Sindh	Self Consumption	22-07-2009	21-07-2029

TABLE 49 List of Licenses Issued to Distribution Companies

Source: National Electric Power Regulatory Authority
State of Industry Report 2018 = = = = = = =

DISCO	Service Area (Sq. km)	Service Area
PESCO	77,474	Whole Province of Khyber Pakhtunkhwa, except tribal areas
TESCO	27,220	Federally Administrated Tribal Areas (FATA) (comprising of Bajur, Mohmand, Khyber, Ourakzai, Kurrum, North Waziristan, South Waziristan agencies) and Frontier Regions (FRs) (i.e. FR Peshawar, FR Kohat, FR Bannu, FR Lakki, FR Tank and FR Dera Ismail Khan
IESCO	23,160	Federal Capital Islamabad, Rawalpindi, Attock, Jhelum, Chakwal
GEPCO	17,207	Gujranwala, Sialkot, Mandi Bahauddin, Hafizabad, Narowal, Gujrat
LESCO	19,064	Lahore, Sheikhupura, Kasur, Okara, Nankana
FESCO	36,122	Faisalabad, Sargodha, Khushab, Jhang, Toba Tek Singh, Bhalwal, Mianwali, Bhakkar
MEPCO	105,505	Multan, Rahim Yar Khan, Khanewal, Sahiwal, Pakpattan, Vehari, Muzaffargarh, Dera Ghazi Khan, Leiah, Rajan Pur, Bahawalpur, Lodhran, Bahawalnagar
HESCO	81,087	All Province of Sindh except Karachi, Sukkur, Ghotki, Khairpur, Kashmore, Kandhkot, Jacobabad, Shikarpur, Larkana, Kambar, Shahdadkot, Dadu and some portions of Jamshoro, Naushehro Feroz, Shaheed Benazirabad and Rahimyar Khan
SEPCO	56,300	Sukkur, Ghotki, Khairpur, Kashmore, Kandhkot, Jacobabad, Shikarpur, Larkana, Kambar, Shahdadkot, Dadu and some portions of Jamshoro, Naushehro Feroz, Shaheed Benazirabad and Rahim Yar Khan
QESCO	334,616	Whole Province of Balochistan, except Lasbela where K-Electric is responsible for distribution of power
KEL	6,500	Entire Karachi and its suburbs upto Dhabeji and Gharo in Sindh and over Hub, Uthal, Vindhar

TABLE 50 Service Area of Distribution Companies

Source: National Electric Power Regulatory Authority

13.2 ROLE OF DISTRIBUTION COMPANIES

The distribution companies licensed under Section 21 of NEPRA Act are responsible for channeling electricity from the transmission substations below 220 kV to the consumers at different distribution voltages. The distribution network is composed of lines and grid stations of 132 kV and lower voltage levels, and each distribution company is responsible for constructing, operating, and maintaining the power distribution facilities within its dedicated geographic area.

	IABLE	51			
Peak Dema	nd of Distribu	tion Compani	ies (MW)		
DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
PESCO	2,746	2,798	2,809	3,110	3,242
Peak Demand Growth Rate over Last Year	(6.79)	1.89	0.39	10.72	4.24
TESCO	653	668	570	609	883
Peak Demand Growth Rate over Last Year	(20.75)	2.30	(14.67)	6.84	44.99
IESCO	2,565	2,277	2,297	2,314	2,452
Peak Demand Growth Rate over Last Year	10.32	(11.23)	0.88	0.74	5.96
GEPCO	2,190	2,386	2,321	2,413	2,429
Peak Demand Growth Rate over Last Year	7.93	8.95	(2.72)	3.96	0.66
LESCO	4,588	5,021	4,404	4,765	4,980
Peak Demand Growth Rate over Last Year	(4.16)	9.44	(12.29)	8.20	4.51
FESCO	2,959	3,091	3,056	3,053	3,036
Peak Demand Growth Rate over Last Year	7.72	4.46	(1.13)	(0.10)	(0.56)
MEPCO	3,570	2,892	3,495	3,663	4,018
Peak Demand Growth Rate over Last Year	6.25	(18.99)	20.85	4.81	9.69
HESCO	1,216	1,167	1,172	1,234	1,256
Peak Demand Growth Rate over Last Year	15.26	(4.03)	0.43	5.29	1.78
SEPCO	1,288	1,357	1,378	1,359	1,318
Peak Demand Growth Rate over Last Year	0.63	5.36	1.55	(1.38)	(3.02)

DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
QESCO	1,650	1,762	1,765	1,770	1,800
Peak Demand Growth Rate over Last Year	7.84	6.79	0.17	0.28	1.69
KEL	2,929	3,056	3,195	3,270	3,527
Peak Demand Growth Rate over Last Year	5.44	4.34	4.55	2.35	7.86
Peak Demand in PEPCO System	23,425	23,419	23,267	24,290	25,414
Peak Demand Growth Rate over Last Year	2.37	(0.03)	(0.65)	4.40	4.63

Source: Distribution Companies / KEL

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	Category-wise Number of Consumers									
DISCO	As on 30 th June	Domestic	Commercial	Industrial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Total	
	2014	2523470	289155	29760	23441	1028	878	46	2867778	
0	2015	2602181	298739	30344	23328	1040	888	47	2956567	
SC	2016	2703406	309919	31204	23371	1057	863	76	3069896	
Б	2017	2805422	321802	32023	23289	1088	904	48	3184576	
	2018	2908414	337386	29872	23083	1096	925	30131	3330907	
	2014	400600	28202	4081	8548	0	55	0	441486	
0	2015	400613	28217	4101	8576	0	55	0	441562	
SC	2016	401234	28277	4142	8031	0	55	0	441739	
Ë	2017	402521	28382	4236	6741	0	61	0	441941	
	2018	402209	28625	4268	6118	5	57	1119	442401	
	2014	2013135	340925	14534	8052	1659	957	40	2379302	
0	2015	2085256	350989	15048	8192	1674	968	40	2462167	
Š	2016	2174389	362837	15480	8293	1713	876	149	2563737	
<u> </u>	2017	2270874	374610	15979	8436	1742	892	149	2672682	
	2018	2405253	394381	16053	7182	1761	886	11722	2837238	
	2014	2419346	304496	57965	41583	507	141	15	2824053	
0	2015	2506136	313573	60542	42563	514	149	16	2923493	
GEPC	2016	2621619	324937	63705	43055	532	153	16	3054017	
	2017	2726893	334915	66845	43594	549	157	16	3172969	
	2018	2860915	349789	70063	44749	578	164	16	3326274	
	2014	3052697	524702	75006	57313	2154	491	223	3712586	
0	2015	3228511	542738	77277	58382	2227	490	237	3909862	
S	2016	3403443	561030	79588	59136	2338	490	241	4106266	
"	2017	3556800	576691	81640	59664	2424	496	246	4277961	
	2018	3848417	602268	84183	60621	2547	499	249	4598784	
	2014	2870418	332675	45120	38921	1470	215	111	3288930	
0	2015	3012756	344642	46602	39522	1500	218	117	3445357	
S	2016	3141713	356032	47909	39995	1566	227	123	3587565	
Ē	2017	3280658	368321	49350	40580	1640	229	128	3740906	
	2018	3457159	383451	49314	40772	1719	232	20485	3953132	
	2014	4278223	455088	49599	75484	1365	420	117	4860296	
8	2015	4508987	476683	51135	77317	1402	428	120	5116072	
EPC	2016	4746997	494523	52845	78399	1448	437	124	5374773	
Σ	2017	5050877	514327	54176	79965	1470	451	124	5701390	
	2018	5398111	536876	54772	80944	1494	460	126	6072783	
	2014	777599	143685	13834	16198	322	533	92	952263	
0	2015	798206	146831	14311	16578	332	533	97	976888	
ESC	2016	825409	150786	14784	16786	533	334	99	1008731	
Ī	2017	861184	156200	15313	17286	540	335	98	1050956	
	2018	877263	159627	14924	13730	540	337	14293	1080714	

TABLE 52 Category-wise Number of Consumers

DISCO	As on 30 th June	Domestic	Commercial	Industrial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Total
	2014	572945	114072	11846	12408	410	497	18	712196
0	2015	581305	115574	12094	12484	412	504	19	722392
<u>S</u>	2016	590240	117093	12405	12503	414	504	19	733178
SE	2017	593355	117824	12606	12145	412	507	19	736868
	2018	589884	119384	12674	9221	421	519	13205	745308
	2014	414231	102089	3549	28630	243	234	4	548980
0	2015	423876	105721	3662	31139	247	238	4	564887
S	2016	432262	108797	3754	31504	251	244	4	576816
ð	2017	442895	112445	3877	31824	254	253	4	591552
	2018	453232	116267	3730	29580	265	261	5669	609004
	2014	1650034	438150	20464	2410	74	202	2	2111336
	2015	1695782	439130	20614	2488	77	198	1	2158290
KEL	2016	1758467	444687	20626	2623	72	201	1	2226677
_	2017	1945721	456517	20868	2619	73	199	1	2425998
	2018	2096451	463670	20647	2398	74	194	1	2583435
	2014	19322664	2635089	305294	310578	9158	4421	666	22587870
3 O E	2015	20147827	2723707	315116	318081	9348	4471	697	23519247
tal PC ste	2016	21040712	2814231	325816	321073	9852	4183	851	24516718
5 g S	2017	21991479	2905517	336045	323524	10119	4285	832	25571801
	2018	23200857	3028054	339853	316000	10426	4340	97015	26996545

Source: Distribution Companies / KEL

TABLE 53

Number of Circles, Divisions, Sub-Divisions, 11 kV Feeders and Loading Position of 11 kV Feeders

DISCO	As on	Circles	Divisions	Sub-	11 kV	Loa	ading Positi	on of 11 kV Fe	eders (N	os.)
DISCO	30 th June	Circles	Divisions	Divisions	Feeders	80-90%	91-100%	Above 100%	Total	%age
	2014	6	33	147	789	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	6	34	149	877	97	137	183	417	47.55
S	2016	7	34	158	907	103	126	167	396	43.66
a a	2017	8	39	172	946	84	183	218	485	51.27
	2018	8	39	216	1,012	155	139	118	412	40.71
	2014	1	6	18	173	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	1	6	18	183	41	42	-	83	45.36
S:	2016	1	6	18	195	71	103	-	174	89.23
μË	2017	1	7	20	199	14	185	-	199	100.00
	2018	1	7	20	207	17	190	-	207	100.00
	2014	5	19	105	966	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	5	19	108	965	63	40	12	115	11.92
S	2016	5	19	108	1,036	41	19	12	72	6.95
_ ≝	2017	5	19	108	1,058	11	12	4	27	2.55
	2018	5	19	109	1,068	17	8	0	25	2.34
	2014	4	23	115	725	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	5	24	115	745	206	116	36	358	48.05
<u> </u>	2016	5	24	115	779	111	50	6	167	21.44
5	2017	5	24	118	805	49	32	7	88	10.93
	2018	5	24	118	835	32	23	4	59	7.07
	2014	7	33	164	1,437	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	7	33	164	1,540	395	234	70	699	45.39
SC	2016	7	33	192	1,580	123	189	38	350	22.15
"	2017	7	33	192	1,650	133	315	100	548	33.21
	2018	7	33	192	1,741	23	198	196	417	23.95

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DISCO	As on	Circles	Divisions	Sub-	11 kV	Loa	ding Positi	on of 11 kV Fe	eders (No	os.)
DISCO	30 th June	Circles	Divisions	Divisions	Feeders	80-90%	91-100%	Above 100%	Total	%age
	2014	4	21	118	900	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	4	24	130	901	91	65	13	169	18.76
S	2016	4	24	130	936	91	83	15	189	20.19
Ë	2017	4	24	130	998	94	63	2	159	15.93
	2018	4	25	138	1,023	105	43	1	149	14.57
	2014	8	35	160	1,039	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	8	35	160	1,139	114	304	9	427	37.49
<u> </u>	2016	9	37	170	1,165	194	130	104	428	36.74
Σ	2017	9	37	174	1,241	210	142	81	433	34.89
	2018	9	37	174	1,324	156	157	60	373	28.17
	2014	3	14	62	410*	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	4	15	67	425	15	47	24	86	20.24
S	2016	4	15	67	435	21	61	21	103	23.68
Ī	2017	4	15	68	479	33	54	34	121	25.26
	2018	4	15	68	502	18	38	13	69	13.75
	2014	3	13	55	413	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	7	29	96	433	73	51	76	200	46.19
PC	2016	7	29	96	453	64	46	69	179	39.51
SE	2017	7	29	96	462	47	41	79	167	36.15
	2018	7	29	96	490	56	45	56	157	32.04
	2014	4	13	44	550	n.a.	n.a.	n.a.	n.a.	n.a.
0	2015	4	14	46	570	23	17	45	85	14.91
SS SS	2016	6	14	54	613	47	67	107	221	36.05
ō	2017	6	14	55	628	51	71	111	233	37.10
	2018	6	14	55	648	56	74	81	211	32.56
	2014	45	210	988	7,402	n.a.	n.a.	n.a.	n.a.	n.a.
3 O E	2015	51	233	1,053	7,778	1,118	1,053	468	2,639	33.93
tal PC	2016	55	235	1,108	8,099	866	874	539	2,279	28.14
S B S	2017	56	241	1,133	8,466	726	1,098	636	2,460	29.06
	2018	56	242	1,186	8,850	635	915	529	2,079	23.49
	As on		BCc	11 LV E	oodorc	Loading	Position of	11 kV Feeders	(Nos.)	%200
	30 th June		BCS	IIKVF	eeuers	80-90%	91-100%	Above 100%	Total	//aye
_ 1	2014		28	1,3	75	n.a.	n.a.	n.a.	n.a.	n.a.
KEI	2015		28	1,4	31	156	69	40	265	18.52
-	2016		29	1,5	24	76	20	8	104	6.82
	2017		29	1,6	53	70	15	6	91	5.51
	2018		29	1,7	29	22	6	1	29	1.68

** 32 feeders dismantled due to flood and cyclonic effects. Source: Distribution Companies / KEL*

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DISCO	As on 30 th June	Domestic	Commercial	Industrial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Total		
	2014	3270.83	630.37	1278.28	169.63	58.93	229.90	3.87	5641.81		
Q	2015	3427.01	658.62	1327.97	169.88	55.11	244.47	3.88	5886.94		
S	2016	3649.69	690.88	1377.96	170.92	52.78	198.62	55.07	6195.92		
B	2017	3870.45	726.79	1460.72	169.04	52.90	256.27	3.62	6539.79		
	2018	4015.16	766.87	1510.76	166.92	53.12	282.78	208.33	7003.94		
	2014	754.00	35.00	86.00	92.00	0.00	4.00	0.00	971.00		
0	2015	754.00	35.00	96.00	93.00	0.00	4.00	0.00	982.00		
S	2016	758.00	35.00	102.00	90.00	0.00	4.00	0.00	989.00		
Ë	2017	795.00	45.00	132.00	100.00	0.00	5.00	0.00	1077.00		
	2018	801.00	65.00	156.00	200.00	0.00	8.00	0.00	1230.00		
	2014	3575.21	1005.14	941.62	86.30	99.27	469.02	289.01	6465.57		
0	2015	3723.28	1043.20	971.22	88.68	99.37	483.05	289.01	6697.81		
SC	2016	3889.96	1078.30	995.53	90.48	99.70	502.30	290.14	6946.41		
_ ≝	2017	4083.11	1115.34	1034.46	93.29	100.01	554.40	290.27	7270.88		
	2018	4258.00	1170.00	1065.00	69.00	100.00	543.00	481.00	7686.00		
	2014	3380.00	616.00	1446.00	291.00	34.00	70.00	1.00	5838.00		
0	2015	3542.88	646.61	1528.06	297.27	33.73	88.76	0.74	6138.05		
L L L	2016	3761.73	680.89	1605.40	301.12	33.11	89.20	0.74	6472.20		
Ū	2017	3968.27	717.26	1685.37	305.40	32.40	91.26	1.22	6801.18		
	2018	4215.95	774.77	1769.90	317.48	32.73	98.99	93.04	7302.86		
	2014	4606.00	1420.00	3767.00	584.00	113.00	176.00	40.00	10706.00		
0	2015	4912.00	1482.00	3915.00	596.00	112.00	179.00	42.00	11238.00		
S:	2016	5225.00	1558.00	4112.00	607.00	113.00	200.00	41.00	11856.00		
	2017	5525.57	1638.61	4294.52	615.92	113.11	217.88	42.25	12447.86		
	2018	6074.75	1735.78	4521.90	637.46	115.45	253.24	42.36	13380.95		
	2014	6922.50	729.95	1773.72	444.79	10.73	150.41	6.45	10038.55		
0	2015	7290.00	768.00	1901.00	451.00	11.00	187.00	7.00	10615.00		
ESC	2016	7638.00	805.00	2006.00	454.00	11.00	199.00	7.00	11120.00		
Ē	2017	8024.00	856.00	2118.00	462.00	10.00	204.00	7.00	11681.00		
	2018	8492.00	916.00	2221.00	459.00	11.00	216.00	149.00	12464.00		
	2014	5916.49	878.07	2118.38	1168.23	15.11	99.03	23.41	10218.72		
8	2015	6292.03	917.43	2194.31	1195.08	15.19	105.09	23.74	10742.87		
Ē	2016	6657.42	959.06	2251.58	1193.60	14.33	112.96	24.02	11212.97		
Σ	2017	7124.70	1003.99	2291.82	1210.08	14.20	117.80	23.69	11786.28		
	2018	7895.99	1095.65	2494.57	1253.41	14.99	136.42	24.38	12915.41		
_	2014	1036.82	260.44	736.80	225.53	43.71	25.56	7.82	2336.68		
8	2015	1065.48	269.34	777.41	229.41	44.77	25.56	8.21	2420.18		
ES	2016	1104.19	281.22	816.79	233.02	23.93	47.76	8.29	2515.20		
T	2017	1161.14	298.80	854.15	236.85	24.02	47.29	8.46	2630.71		
	2018	1151.18	302.40	863.55	182.26	24.02	57.50	154.50	2/35.41		
	2014	638.05	185.40	356.98	175.81	12.24	51.72	2.18	1422.37		
8	2015	655.01	192.22	362.59	178.80	12.30	52.09	2.20	1455.20		
Ē	2016	661.68	196.44	379.85	1/1./5	12.57	70.02	2.75	1495.06		
S	2017	667.88	200.42	409.58	167.65	12.56	61.40	2.24	1521.73		
	2018	625.26	206.91	426.26	109.72	12.67	68.67	119.68	1569.17		
	2014	617.83	168.06	150.83	/88.69	5.35	52.10	0.02	1/82.87		
N	2015	629.99	174.02	158.28	864.48	5.47	52.44	0.02	1010.22		
SES	2016	642.31	1/8.40	103.17	0/5./5	5.49	53.18	0.02	1918.32		
0	2017	656.20	184.81	1/1./4	885.65	5.54	54.49	0.02	1958.46		
	2018	657.65	191.68	1/6.26	826.34	5.72	60.59	87.27	2005.52		

TABLE 54 Category-wise Sanctioned Load (MW)

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DISCO	As on 30 th June	Domestic	Commercial	Industrial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Total
	2014	3741.00	1504.00	1544.00	37.00	1.00	123.00	0.00	6950.00
	2015	4008.00	1579.00	1674.00	40.00	1.00	135.00	0.00	7437.00
Ē	2016	4450.00	1625.00	1751.00	43.00	1.00	147.00	0.00	8017.00
	2017	5047.00	1709.00	1847.00	43.00	1.00	189.00	0.00	8836.00
	2018	5659.00	1831.00	2035.00	44.00	1.00	190.00	0.00	9760.00
	2014	30717.73	5928.43	12655.61	4025.98	392.34	1327.74	373.76	55421.57
3 O E	2015	32291.67	6186.43	13231.84	4163.60	388.94	1421.45	376.79	58060.73
tal PC ste	2016	33987.98	6463.19	13810.28	4187.65	365.90	1477.04	429.04	60721.07
PE Sys	2017	35876.32	6787.02	14452.37	4245.88	364.75	1609.79	378.77	63714.89
	2018	38186.95	7225.06	15205.21	4221.59	369.70	1725.19	1359.56	68293.25

Source: Distribution Companies / KEL

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TABLE 55 Category-wise Electricity Sold (GWh)

DISCO	Year	Domestic	Commercial	Industrial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Total
	2013-14	4204.75	621.54	1988.72	100.42	14.07	539.23	2.60	7471.33
0	2014-15	4296.71	653.63	2019.91	92.61	14.17	519.50	2.38	7598.91
Si Si	2015-16	4481.63	702.62	1955.74	82.43	12.87	279.85	267.77	7782.91
Ā	2016-17	4882.80	739.50	2131.50	83.10	13.24	579.70	2.19	8432.03
	2017-18	4928.26	769.93	2321.87	78.90	13.47	642.50	40.60	8795.53
	2013-14	1225.00	10.00	63.00	59.00	0.00	7.00	0.00	1364.00
0	2014-15	972.43	6.43	62.96	51.90	0.00	7.47	0.00	1101.19
Si Si	2015-16	881.16	7.49	88.16	44.17	0.00	7.50	0.00	1028.48
Ē	2016-17	1017.69	6.86	145.26	49.72	0.00	7.60	0.00	1227.13
	2017-18	1195.10	5.93	227.68	42.01	0.00	8.59	2.48	1481.79
	2013-14	3681.00	894.00	1644.00	93.00	78.00	1798.00	4.00	8192.00
0	2014-15	3704.00	844.00	1671.00	93.00	76.00	1755.00	4.00	8147.00
SC	2015-16	4093.00	932.00	1663.00	98.00	71.00	1078.00	839.00	8774.00
_ ≝	2016-17	4557.10	1073.10	1744.10	106.10	72.10	951.05	1124.00	9627.55
	2017-18	5035.44	1200.07	1861.61	96.35	72.58	2283.58	56.31	10605.94
	2013-14	3859.79	398.76	1965.59	304.13	5.97	292.35	0.98	6827.56
0	2014-15	3987.39	404.96	2076.92	285.38	6.30	293.12	1.13	7055.20
L N	2015-16	4563.95	478.00	2371.17	341.80	6.64	326.16	1.12	8088.83
5	2016-17	5081.33	544.74	2424.36	363.50	7.50	355.46	0.89	8777.78
	2017-18	5757.44	615.06	2696.34	400.60	7.91	381.88	27.61	9886.84
	2013-14	6278.23	1215.10	6772.93	1126.51	102.82	445.84	6.86	15948.29
0	2014-15	6550.28	1235.28	6887.75	1084.09	94.36	468.99	7.61	16328.36
S	2015-16	7219.80	1402.25	6896.16	1203.48	97.59	514.39	8.31	17341.98
5	2016-17	8159.96	1578.03	6173.45	1196.52	95.18	572.30	7.37	17782.81
	2017-18	9021.27	1792.33	7587.38	1259.50	119.05	660.91	8.06	20448.50
	2013-14	4256.25	482.80	3804.13	830.57	7.38	296.45	4.13	9681.71
0	2014-15	4426.20	492.06	3971.81	787.81	7.44	316.56	4.36	10006.24
S	2015-16	5037.06	562.72	3938.90	790.02	8.06	358.80	4.73	10700.29
Ē	2016-17	5709.59	657.89	3844.79	929.97	11.09	341.21	4.22	11498.76
	2017-18	6506.58	737.86	4220.72	1066.69	12.39	338.75	41.58	12924.57
	2013-14	5518.29	640.11	2990.57	2090.03	17.25	172.63	8.37	11437.25
0	2014-15	6013.54	657.39	3070.54	1745.20	16.16	200.22	8.20	11711.25
EP	2015-16	6626.63	730.06	2855.18	1880.00	16.37	224.10	8.33	12340.67
Σ	2016-17	7567.44	846.06	2289.66	2271.17	19.72	252.38	6.77	13253.20
	2017-18	8895.71	967.10	2960.58	2653.26	20.37	293.21	62.99	15853.22

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DISCO	Year	Domestic	Commercial	Industrial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Total
	2013-14	2073.85	260.31	770.16	445.88	84.53	46.53	3.24	3684.50
0	2014-15	2421.06	270.51	760.25	416.24	105.12	42.77	3.61	4019.56
ESC	2015-16	2094.92	279.54	812.63	420.38	35.73	92.32	3.65	3739.17
I	2016-17	2155.02	307.88	721.33	400.33	35.31	94.45	3.81	3718.13
	2017-18	2342.17	315.19	759.07	372.78	37.64	104.59	95.52	4026.96
	2013-14	1649.89	168.18	417.46	242.95	77.65	144.57	1.18	2701.88
0	2014-15	1233.13	164.70	412.18	226.00	68.85	141.44	1.67	2247.97
l ä	2015-16	1349.54	201.99	430.72	238.62	42.54	149.67	1.51	2414.59
S	2016-17	1650.48	235.63	439.06	245.32	39.24	176.65	1.35	2787.73
	2017-18	1759.45	218.81	465.88	245.18	27.29	177.99	68.21	2962.81
	2013-14	575.25	101.70	134.24	2837.00	2.23	93.95	0.04	3744.41
0	2014-15	573.16	108.93	140.00	3067.74	2.91	101.00	0.06	3993.80
ESC	2015-16	593.60	114.76	136.09	3263.37	3.84	108.11	0.07	4219.84
Ø	2016-17	637.07	124.94	153.09	3417.43	4.92	115.02	0.11	4452.58
	2017-18	672.30	131.05	173.04	3762.35	8.25	122.16	46.82	4915.97
	2013-14	5489.00	1507.00	3568.00	160.00	106.00	427.00	197.00	11454.00
	2014-15	6150.00	1600.00	3844.00	166.00	110.00	410.00	13.00	12293.00
XEI	2015-16	6596.00	1685.00	3830.00	163.00	163.00	412.00	15.00	12864.00
_	2016-17	6643.00	1655.00	3885.00	159.00	187.00	433.00	19.00	12981.00
	2017-18	7170.00	1758.00	4124.00	151.00	157.00	471.00	29.00	13860.00
	2013-14	33322.30	4792.50	20550.80	8129.49	389.90	3836.55	31.40	71052.93
3 O E.	2014-15	34177.90	4837.89	21073.32	7849.97	391.31	3846.07	33.02	72209.48
E E E E E E E E E E E E E E E E E E E	2015-16	36941.29	5411.43	21147.75	8362.27	294.64	3138.90	1134.49	76430.76
5 <u>⊒</u>	2016-17	41418.48	6114.63	20066.60	9063.16	298.30	3445.82	1150.71	81557.70
	2017-18	46113.72	6753.33	23274.17	9977.62	318.95	5014.16	450.18	91902.13

Source: Distribution Companies / KEL

			Total Unit	ts Purchased, Sold and Losses			
			Unit Pu	rchased (GWh)	Unit	Losse	S
DISCO	Year	Through	Through CPPs,	Total Unit Purchased	Sold (GWb)	GWh	%age
	2013-14	11249.80	51.00	11300.80	7471 33	3829.47	33.89
0	2013-14	11657 30	0.00	11657 30	7598.91	4058 39	34.81
ŭ	2015-16	11751.00	0.00	11751.00	7782 91	3968.09	33.77
ы Б	2016-17	12510.96	0.00	12510.96	8432.03	4078.93	32.60
	2017-18	14220.30	0.00	14220.30	8795.53	5424.77	38.15
	2013-14	1757.98	0.00	1757.98	1364.00	393.98	22.41
TESCO	2014-15	1425.00	0.00	1425.00	1101.19	323.81	22.72
	2015-16	1269.00	0.00	1269.00	1028.48	240.52	18.95
	2016-17	1450.58	0.00	1450.58	1227.13	223.45	15.40
	2017-18	1692.82	0.00	1692.82	1481.79	211.03	12.47
	2013-14	9049.00	0.00	9049.00	8192.00	857.00	9.47
0	2014-15	8993.00	0.00	8993.00	8147.00	846.00	9.41
Š	2015-16	9652.00	0.00	9652.00	8774.00	878.00	9.10
ш	2016-17	10582.64	0.00	10582.64	9627.55	955.09	9.03
	2017-18	11672.97	0.00	11672.97	10605.94	1067.03	9.14
	2013-14	7671.40	0.00	7671.40	6827.56	843.84	11.00
0	2014-15	7902.19	0.00	7902.19	7055.20	846.99	10.72
Ä	2015-16	9045.48	0.00	9045.48	8088.83	956.65	10.58
5	2016-17	9778.56	0.00	9778.56	8777.78	1000.78	10.23
Ŭ	2017-18	10987.15	0.00	10987.15	9886.84	1100.31	10.01

TABLE 56Total Units Purchased, Sold and Losses

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			Unit Pur	chased (GWh)		Unit	Loss	es
DISCO	Year	Through	Through CPPs,	Total	Unit	Sold	GWb	%200
		NTDC	SPPs etc.	Purch	ased	(GWh)	Gwn	%age
	2013-14	18424.98	0.00	1842	4.98	15948.29	2476.69	13.44
0	2014-15	19009.00	0.00	1900	9.00	16328.36	2680.64	14.10
Si Si	2015-16	20151.92	0.00	2015	1.92	17341.98	2809.94	13.94
=	2016-17	20621.54	0.00	2062	1.54	17782.81	2838.73	13.77
	2017-18	23731.24	0.00	2373	1.24	20448.50	3282.74	13.83
	2013-14	7811.00	3099.00	1091	0.00	9681.71	1228.29	11.26
0	2014-15	11243.37	0.00	1124	3.37	10006.24	1237.13	11.00
S	2015-16	11920.35	0.00	1192	0.35	10700.29	1220.06	10.24
Ë	2016-17	12857.80	0.00	1285	7.80	11498.76	1359.04	10.57
	2017-18	14446.26	0.00	1444	6.26	12924.57	1521.69	10.53
	2013-14	13980.86	80.91	1406	1.77	11437.25	2624.52	18.66
8	2014-15	13819.83	39.12	1385	8.95	11711.25	2147.70	15.50
Ъ.	2015-16	13328.75	1441.50	1477	12340.67	2429.58	16.45	
Σ	2016-17	12156.93	3794.65	1595	1.58	13253.20	2698.38	16.92
	2017-18	14928.56	4077.41	1900	5.97	15853.22	3152.75	16.59
	2013-14	4605.00	405.00	5010	0.00	3684.50	1325.50	26.46
0	2014-15	4965.00	547.00	5512	2.00	4019.56	1492.44	27.08
S: S: S: S: S: S: S: S: S: S: S: S: S: S	2015-16	3245.50	1839.86	508	5.36	3739.17	1346.19	26.47
HESC	2016-17	3298.98	2057.46	5350	6.44	3718.13	1638.31	30.59
	2017-18	3815.59	1927.43	5743	3.02	4026.96	1716.06	29.88
	2013-14	4129.20	268.53	439	7.73	2701.88	1695.85	38.56
0	2014-15	4114.41	231.47	434	2247.97	2097.91	48.27	
<u> </u>	2015-16	4168.17	20.24	4188	3.41	2414.59	1773.82	42.35
S	2016-17	4457.32	25.33	4482	2.65	2787.73	1694.92	37.81
	2017-18	4653.40	25.33	4678	3.73	2962.81	1715.92	36.67
	2013-14	4956.30	0.00	4950	5.30	3744.41	1211.89	24.45
0	2014-15	5193.50	0.00	5193	3.50	3993.80	1199.70	23.10
S.	2015-16	5538.01	0.00	5538	3.01	4219.84	1318.17	23.80
ō	2016-17	5788.76	0.00	5788	3.76	4452.58	1336.18	23.08
	2017-18	6338.40	0.00	6338	3.40	4915.97	1422.43	22.44
	2013-14	83635.52	3904.44	8753	9.96	71052.93	16487.04	18.83
3 <u>0</u> 2.	2014-15	88322.60	817.59	8914	0.19	72209.48	16930.72	18.99
tal PC ste	2015-16	90070.18	3301.60	9337	1.78	76430.76	16941.02	18.14
S B G	2016-17	93504.07	5877.44	9938	1.51	81557.70	17823.81	17.93
	2017-18	106486.69	6030.17	1125	16.86	91902.13	20614.73	18.32
			Unit Pur	chased (GWh)		Unit	Loss	es
	Year	KEL	Through	Through CPPs + Others	Total Unit	Sold (GWb)	GWh	%age
	2013-14	8709.00	5441.00	1841 00	15991 00	11454.00	4537.00	28 37
KE	2014-15	9319.00	5427.00	2069.00	16815.00	12293.00	4522.00	26.89
	2015-16	10323.00	5059.00	1922 00	17304 00	12864.00	4440.00	25.66
	2016-17	10147.00	5077.00	2128.00	17352 00	12981 00	4371.00	25.00
	2017-18	10338.00	5128.00	2733.00	18199.00	13860.00	4339.00	23.84
	2017-10	10550.00	5120.00	2155.00	10199.00	15000.00	-359.00	25.04

Source: Distribution Companies / KEL

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DIS	со	Unit	Domestic	Comm- ercial	Indus- trial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Total
_	*	GWh	4928.26	769.93	2321.87	78.90	13.47	642.50	40.60	8795.53
8	**	Rs. Mln.	50818.98	15475.32	34547.51	935.21	221.77	9166.42	595.76	111760.97
ES	ىلە بلە بلە	Rs. Mln.	42616.62	15465.71	33314.56	787.16	227.06	5553.61	1058.91	99023.63
<u> </u>	^^^	%	83.86	99.94	96.43	84.17	102.39	60.59	177.74	88.60
_	*	GWh	1195.10	5.93	227.68	42.01	0.00	8.59	2.48	1481.79
8	**	Rs. Mln.	13882.27	154.23	3803.02	786.61	0.03	142.78	41.91	18810.85
ES	***	Rs. Mln.	9209.21	58.20	2628.25	461.71	0.04	118.76	54.40	12530.57
		%	66.34	37.74	69.11	58.70	0.00	83.18	0.00	66.61
_	*	GWh	5035.44	1200.07	1861.61	96.35	72.58	2283.58	56.31	10605.94
8	**	Rs. Mln.	57288.76	24343.23	27934.81	1201.72	1182.57	31239.72	888.08	144078.89
ĒŠ	+++	Rs. Mln.	55890.35	24282.18	26891.90	1233.70	1241.40	18697.28	1078.95	129315.76
-	~~~	%	97.56	99.75	96.27	102.66	104.97	59.85	121.49	89.75
	*	GWh	5757.44	615.06	2696.34	400.60	7.91	381.88	27.61	9886.84
U U	**	Rs. Mln.	62236.65	13539.78	40289.75	3710.84	141.81	5336.92	480.41	125736.16
E E	+++	Rs. Mln.	61457.84	13539.53	38610.67	3694.25	122.75	2927.65	440.94	120793.63
0	~~~	%	98.75	100.00	95.83	99.55	86.56	54.86	91.78	96.07
-	*	GWh	9021.27	1792.33	7587.38	1259.50	119.05	660.91	8.06	20448.50
8	**	Rs. Mln.	108736.82	37722.64	111401.51	12247.00	2064.49	10284.09	131.43	282587.98
ĒS	+++	Rs. Mln.	106842.88	37208.77	104585.36	10543.19	1748.58	10010.68	152.86	271092.32
	~~~	%	98.26	98.64	93.88	86.09	84.70	97.34	116.31	95.93
_	*	GWh	6506.58	737.86	4220.72	1066.69	12.39	338.75	41.58	12924.57
8	**	Rs. Mln.	70406.96	15986.01	61245.85	8836.39	231.26	5121.13	710.89	162538.49
ES	***	Rs. Mln.	69740.67	15953.92	58757.26	8603.14	218.70	5125.91	768.55	159168.15
-		%	99.05	99.80	95.94	97.36	94.57	100.09	108.11	97.93
•	*	GWh	8895.71	967.10	2960.58	2653.26	20.37	293.21	62.99	15853.22
ŭ	**	Rs. Mln.	93465.52	20952.68	44955.83	21971.30	346.19	4439.89	1078.07	187209.48
1EF	***	Rs. Mln.	92000.68	20567.91	41025.22	18106.58	348.94	4007.21	1003.99	177060.53
~		%	98.43	98.16	91.26	82.41	100.79	90.25	93.13	94.58
•	*	GWh	2342.17	315.19	759.07	372.78	37.64	104.59	95.52	4026.96
ŭ	**	Rs. Mln.	26089.95	6671.71	12354.87	4540.14	623.29	1716.58	1615.08	53611.62
Ϋ́	***	Rs. Mln.	15269.05	6356.92	11667.62	3916.97	510.13	1572.46	1134.33	40427.48
		%	58.52	95.28	94.44	86.27	81.84	91.60	70.23	75.41
	*	GWh	1759.45	218.81	465.88	245.18	27.29	177.99	68.21	2962.81
ŭ	**	Rs. Mln.	22250.51	4489.96	7898.09	3456.94	551.91	2862.40	693.13	42202.94
SEF	***	Rs. Mln.	7932.34	4409.12	6812.93	2374.46	420.67	2202.29	1053.05	25204.86
		%	35.65	98.20	86.26	68.69	76.22	76.94	151.93	59.72
0	*	GWh	672.30	131.05	173.04	3762.35	8.25	122.16	46.82	4915.97
Š Š	**	Rs. Mln.	8484.72	2772.61	2797.33	54539.63	146.95	1896.33	840.90	71478.47
Ш,	***	Rs. Mln.	3981.97	2615.76	2609.92	6430.60	32.76	1841.32	362.60	17874.93
•		%	46.93	94.34	93.30	11.79	22.29	97.10	43.12	25.01
	*	GWh	7170.00	1758.00	4124.00	151.00	157.00	471.00	29.00	13860.00
E	**	Rs. Mln.	104499.00	43613.00	60656.00	1296.00	2809.00	9009.00	266.00	222148.00
×	***	Rs. Mln.	87998.00	41650.00	61789.00	343.00	1066.00	9146.00	264.00	202256.00
		%	84.21	95.50	101.87	26.47	37.95	101.52	99.25	91.05
۲ tem	*	GWh	46113.72	6753.33	23274.17	9977.62	318.95	5014.16	450.18	91902.13
al i Sys	**	Rs. Mln.	513661.14	142108.17	347228.57	112225.78	5510.27	72206.26	7075.66	1200015.85
S I	***	Rs. Mln.	464941.61	140458.02	326903.69	56151.76	4871.03	52057.17	7108.58	1052491.86
PE		%	90.52	98.84	94.15	50.03	88.40	72.10	100.47	87.71

TABLE 57 Units Billed and Amount Realized in DISCOs (2017-18)

* Units Billed ** Amount of Units Billed *** Amount Realized and %age Recovery to Billed Amount Source: PEPCO / KEL

 $[\Lambda]/$ 

## 

	Average Annual Electricity Consumption per Connection (kWh)											
	Veer	Domostic	Comm-	Indus-	Agricu-	Public	Bulk	Othors	Overall			
DISCO	real	Domestic	ercial	trial	ltural	Lighting	Supply	Others	Overall			
	2013-14	1666.26	2149.50	66825.27	4283.95	13686.77	614157.18	56521.74	2605.27			
8	2014-15	1651.20	2187.96	66567.03	3969.91	13625.00	585022.52	50638.30	2570.18			
ESC	2015-16	1657.77	2267.11	62675.94	3527.02	12175.97	324275.78	3523289.47	2535.24			
₫	2016-17	1740.49	2298.00	66561.53	3568.21	12169.12	641261.06	45625.00	2647.77			
	2017-18	1694.48	2282.04	77727.30	3418.10	12290.15	694594.59	1347.45	2640.58			
	2013-14	3057.91	354.58	15437.39	6902.20	0.00	127272.73	0.00	3089.57			
0	2014-15	2427.36	227.88	15352.35	6051.77	0.00	135818.18	0.00	2493.85			
ESC	2015-16	2196.12	264.88	21284.40	5499.94	0.00	136363.64	0.00	2328.25			
F	2016-17	2528.29	241.70	34291.78	7375.76	0.00	124590.16	0.00	2776.68			
	2017-18	2971.34	207.16	53345.83	6866.62	1.00	150701.75	1.00	3349.43			
	2013-14	1828.49	2622.28	113114.08	11549.93	47016.27	1878787.88	100000.00	3443.03			
0	2014-15	1776.28	2404.63	111044.66	11352.54	45400.24	1813016.53	100000.00	3308.87			
S	2015-16	1882.37	2568.65	107428.94	11817.20	41447.75	1230593.61	5630872.48	3422.35			
=	2016-17	2006.76	2864.58	109149.51	12577.05	41389.21	1066199.55	7543624.16	3602.21			
	2017-18	2093.52	3042.92	115966.49	13415.48	41215.22	2577404.06	4803.79	3738.12			
	2013-14	1595.38	1309.57	33909.96	7313.71	11781.07	2073390.07	65000.00	2417.65			
0	2014-15	1591.05	1291.43	34305.44	6704.98	12256.81	1967221.48	70375.00	2413.28			
EPC	2015-16	1740.89	1471.04	37221.13	7938.68	12479.32	2131732.03	69937.50	2648.59			
ש	2016-17	1863.41	1626.50	36268.38	8338.30	13661.20	2264076.43	55625.00	2766.42			
	2017-18	2012.45	1758.37	38484.51	8952.16	13685.12	2328536.59	1725625.00	2972.35			
	2013-14	2056.62	2315.79	90298.51	19655.40	47734.45	908024.44	30762.33	4295.74			
LESCO	2014-15	2028.89	2276.02	89130.66	18568.91	42370.90	957122.45	32109.70	4176.20			
	2015-16	2121.32	2499.42	86648.24	20351.06	41740.80	1049775.51	34481.33	4223.30			
	2016-17	2294.19	2736.35	75617.96	20054.30	39265.68	1153830.65	29959.35	4156.84			
	2017-18	2344.15	2975.97	90129.60	20776.63	46741.26	1324468.94	32369.48	4446.50			
	2013-14	1482.80	1451.27	84311.39	21339.89	5020.41	1378837.21	37207.21	2943.73			
0	2014-15	1469.15	1427.74	85228.32	19933.45	4960.00	1452110.09	37264.96	2904.27			
ESC	2015-16	1603.28	1580.53	82216.29	19752.97	5146.87	1580616.74	38455.28	2982.61			
LL.	2016-17	1740.38	1786.19	77908.61	22916.95	6762.20	1490000.00	32968.75	3073.79			
	2017-18	1882.06	1924.26	85588.68	26162.32	7207.68	1460129.31	2029.78	3269.45			
	2013-14	1289.86	1406.56	60294.97	27688.38	12637.36	411023.81	71538.46	2353.20			
8	2014-15	1333.68	1379.09	60047.72	22572.01	11526.39	467803.74	68333.33	2289.11			
E	2015-16	1395.96	1476.29	54029.33	23979.90	11305.25	512814.65	6/1//.42	2296.04			
Σ	2016-17	1498.24	1644.98	42263.36	28402.05	13414.97	559600.89	54596.77	2324.56			
	2017-18	1647.93	1801.35	54052.80	32778.96	13634.54	637413.04	499920.63	2610.54			
_	2013-14	2666.99	1811.67	556/1.53	27526.86	262515.53	8/298.31	35217.39	3869.20			
8	2014-15	3033.13	1842.32	53123.47	25107.97	316626.51	80243.90	37216.49	4114.66			
IES	2015-16	2538.04	1853.89	54966.86	25043.49	67035.65	276407.19	36868.69	3706.81			
T	2016-17	2502.39	1971.06	4/105.73	23159.20	65388.89	281940.30	38877.55	3537.86			
	2017-18	2669.86	1974.54	50862.37	2/150.76	69703.70	310356.08	6682.99	3726.20			
	2013-14	28/9.6/	1474.33	35240.59	19580.11	189390.24	290885.31	65555.56	3/93./3			
8	2014-15	2121.31	1425.06	34081.36	18103.17	16/111.65	280634.92	8/894./4	3111.84			
Б	2015-16	2286.43	1725.04	34721.48	19085.02	102753.62	296964.29	79473.68	3293.32			
S	2015-17	2781.61	1999.85	34829.45	20199.26	95242.72	348422.09	/1052.63	3783.21			
	2017-18	2982.71	1832.83	36758.72	26589.31	0176.05	342947.98	5165.47	3975.28			
0	2013-14	1388.72	996.19	3/824./4	99091.86	91/6.95	401495.73	10000.00	6820.67			
S	2014-15	1352.19	1050.35	38230.48	98517.61	11/81.38	424369.75	175000.00	7070.09			
S S	2015-16	13/3.24	1054.81	36252.00	103585.89	15298.80	4430/3.//	17500.00	7515.75			
	2016-17	1438.42	1111.12	39486.72	107385.31	19370.08	454624.51	27500.00	7526.95			

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	2017-18	1483.35	1127.15	46391.42	127192.36	31132.08	468045.98	8258.95	8072.15
DISCO	Year	Domestic	Comm- ercial	Indus- trial	Agricu- ltural	Public Lighting	Bulk Supply	Others	Overall
	2013-14	3326.60	3439.46	174354.96	66390.04	1432432.43	2113861.39	98500000.00	5425.00
	2014-15	3626.65	3643.57	186475.21	66720.26	1428571.43	2070707.07	13000000.00	5695.71
KEL	2015-16	3750.99	3789.18	185687.97	62142.58	2263888.89	2049751.24	15000000.00	5777.22
-	2016-17	3414.16	3625.28	186170.21	60710.19	2561643.84	2175879.40	1900000.00	5350.79
	2017-18	3420.07	3791.49	199738.46	62969.14	2121621.62	2427835.05	2900000.00	5364.95
	2013-14	1724.52	1818.72	67314.79	26175.34	42575.13	867800.95	47139.64	3145.62
3 O E	2014-15	1696.36	1776.21	66874.80	24679.17	41860.29	860225.01	47368.72	3070.23
tal PC ste	2015-16	1755.71	1922.88	64907.04	26044.76	29906.52	750393.26	1333124.56	3117.50
S B S	2016-17	1883.39	2104.49	59714.03	28013.87	29479.20	804158.69	1383064.90	3189.36
	2017-18	1987.59	2230.25	68483.05	31574.75	30591.79	1155336.41	4640.31	3404.22

Source: Distribution Companies / KEL

#### TABLE 59

Distribution Losses (voltage category-wis
-------------------------------------------

	Lossos of	2013-	14	2014-	15	2015-	16	2016-	17	2017-	18
	Losses of	GWh	%								
8	132 kV system (including 66 & 33 kV)	379.50	3.36	379.50	3.26	431.70	3.70	385.00	3.10	393.00	2.80
ES	11 kV and below system	3450.10	31.59	3681.10	31.58	3536.40	31.20	3693.50	30.50	5031.80	36.40
	Overall system	3829.47	33.89	4058.39	34.81	3968.09	33.77	4078.93	32.60	5424.77	38.15
S	132 kV system (including 66 & 33 kV)	98.48	5.60	65.98	4.63	48.86	3.85	44.95	3.10	45.00	2.66
ES	11 kV and below system	295.50	17.81	240.55	17.70	191.62	15.10	177.92	12.27	166.03	10.07
	Overall system	393.98	22.41	323.81	22.72	240.52	18.95	223.45	15.40	211.03	12.47
S	132 kV system (including 66 & 33 kV)	151.12	1.67	177.00	1.96	162.15	1.68	201.00	1.90	215.00	1.84
ĒS	11 kV and below system	705.60	7.93	669.00	7.59	715.53	7.54	754.00	7.26	850.00	7.42
	Overall system	857.00	9.47	846.00	9.41	878.00	9.10	955.09	9.03	1067.03	9.14
9	132 kV system (including 66 & 33 kV)	141.15	1.84	127.46	1.61	141.65	1.57	147.55	1.51	142.10	1.29
Ē	11 kV and below system	702.57	9.33	719.53	9.25	814.99	9.15	853.38	8.86	957.50	8.83
	Overall system	843.84	11.00	846.99	10.72	956.65	10.58	1000.78	10.23	1100.31	10.01
S	132 kV system (including 66 & 33 kV)	145.90	0.79	273.80	1.14	275.54	1.37	233.93	1.10	236.66	1.00
LES	11 kV and below system	2330.80	12.75	2407.10	12.80	2534.41	12.80	2604.85	12.80	3046.04	13.00
-	Overall system	2476.69	13.44	2680.64	14.10	2809.94	13.94	2838.73	13.77	3282.74	13.83
8	132 kV system (including 66 & 33 kV)	211.87	1.94	219.90	2.00	178.80	1.48	244.28	1.90	285.83	1.98
ES	11 kV and below system	1016.33	9.50	1017.24	9.20	1044.97	8.82	1109.92	8.80	1235.87	8.73
	Overall system	1228.29	11.26	1237.13	11.00	1220.06	10.24	1359.04	10.57	1521.69	10.53
8	132 kV system (including 66 & 33 kV)	483.76	3.44	417.14	3.01	436.05	2.91	433.15	2.70	443.91	2.30
1EF	11 kV and below system	2104.59	15.50	1740.71	12.95	1993.54	13.90	2265.24	14.60	2708.85	14.60
~	Overall system	2624.52	18.66	2147.70	15.50	2429.58	16.45	2698.38	16.92	3152.75	16.59
0 C	132 kV system (including 66 & 33 kV)	163.03	3.25	244.83	4.44	177.74	3.60	206.10	3.70	213.00	3.71
TES I	11 kV and below system	1162.06	23.97	1248.32	23.70	1168.45	23.80	1448.90	27.20	1502.90	27.18
-	Overall system	1325.50	26.46	1492.44	27.08	1346.19	26.47	1638.31	30.59	1716.06	29.88
8	132 kV system (including 66 & 33 kV)	125.07	2.84	113.82	2.62	130.38	3.11	147.64	3.29	115.21	2.46
Ē	11 kV and below system	1530.04	35.81	1506.19	35.59	1436.84	35.53	1518.95	35.27	1518.95	35.27
	Overall system	1695.85	38.56	2097.91	48.27	1773.82	42.35	1694.92	37.81	1715.92	36.67
0	132 kV system (including 66 & 33 kV)	160.58	3.24	72.71	1.40	104.59	1.89	114.96	1.99	117.09	1.85
SES	11 kV and below system	1050.26	21.90	1131.69	22.10	1213.60	22.30	1220.70	21.50	1301.21	20.90
0	Overall system	1211.89	24.45	1199.70	23.10	1318.17	23.80	1336.18	23.08	1422.43	22.44

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	Loren of	2013-	14	2014-15		2015-	16	2016-	17	2017-	18
	Losses of	GWh	%								
EL	132 kV system (including 66 & 33 kV)	209.48	1.31	226.00	1.34	218.41	1.32	250.00	1.51	159.00	0.92
K	11 kV and below system	3834.91	24.30	3749.11	22.60	3462.00	21.20	3349.00	20.51	3399.00	19.69
	Overall system	4537.00	28.37	4522.00	26.89	4440.00	25.66	4371.00	25.19	4339.00	23.84
Total Distribution Losses in PEPCO System		16487.04	18.83	16930.72	18.99	16941.02	18.14	17823.81	17.93	20614.73	18.32

Source: Distribution Companies / KEL



#### **13.3 DISTRIBUTION SYSTEM PERFORMANCE**

The continuity of supply is one of the most important indicators to measure the performance of any DISCO. Besides others, the following indicators are commonly used to monitor the system performance of DISCOs, in respect of reliability and quality of supply:

System Average	_	Total annual number of all Consumer Power Supply Interruptions
Index (SAIFI)	=	Total number of consumers served by the distribution company in a given year

System Average Interruption Duration Index (SAIDI)

Aggregate sum of all Consumer Power Supply Interruption durations in minutes Total number of consumers served by the distribution company in a given year

A comparison of SAIFI and SAIDI in respect of all DISCOs of the country, for the year 2013-14 to 2017-18, is included in the following table. Pursuant to NEPRA Performance Standards (Distribution) Rules, 2005 maximum allowed limit for SAIFI is 13 (No.) and for SAIDI is 14 minutes.

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	Co	omparison of SAI	TABLE 60 FI and SAIDI of a	ll Distribution C	ompanies	
	DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
	PESCO	2588473	2618779	2634015	2850613	3060089
	TESCO	390723	384031	390757	n.p.	n.p.
	IESCO	2342241	2423317	2513206	2623499	2819581
	GEPCO	2736688	2812997	3054228	3173183	3256154
	LESCO	3286668	3432160	3600237	4277967	4598788
Total Number	FESCO	3288932	2445562	3587565	3639360	3908172
of Consumers	MEPCO	4693061	4989020	5228862	5527875	5765733
(Nos.)	HESCO	952296	976923	1008762	1050998	1080714
. ,	SEPCO	711727	721087	720120	736901	745342
	OESCO	535145	561280	568826	569399	587446
	KEL	2358357	2317947	2337331	2427413	2798378
	BTPL	15636	16879	19824	23162	26779
	Total	23899947	23699982	25663733	26900370	28647176
	PESCO	819134634	825967981	689188370	457826993	520410346
	TESCO	49458	36879	49480	n.p.	n.p.
	IESCO	120949	86134	78485	76983	103848
	GEPCO	28804296	29294902	108242345	10344034	100842718
Total Annual	LESCO	256478823	180162181	164844249	160171299	151408637
Number of	FESCO	116444302	160355190	116271556	145550105	151924930
Consumer	MEPCO	945813581	886095371	1062001609	1299108797	1823225325
Power Supply	HESCO	218961910	197662324	185846807	198002822	195335124
Interruptions	SEPCO	178978331	164384407	156059275	443148860	423790821
I	OESCO	77573236	63193661	60817656	55187529	55914933
	KEL	58293812	51478645	47967018	47584903	49105263
	BTPL	105	81	103	64	76
	Total	2700653437	2558717756	2591366953	2817002389	3472062021
	PESCO	72339031400	73155560030	65658404750	41741621410	49643188270
	TESCO	819028	508279	819058	n.p.	n.p.
	IESCO	3886042	2411513	2054338	2065394	2059419
Aggregate	GEPCO	35971518	37129560	181711508	174615596	174759910
sum of all	LESCO	15643260013	10331785985	10535348491	23937902384	19950581864
Consumer	FESCO	3739602394	9243009119	6148446280	5575659600	7626311070
Power Supply	MEPCO	83088717833	78216126150	91984306830	11283120340	154650528900
Interruptions	HESCO	15883027060	10397137520	12733146710	13451848430	13285395870
(Duration in	SEPCO	1738562122	1544108334	1353325030	4175349628	3277596441
Minutes)	QESCO	6351140612	4213425000	4146474102	4731924602	4868696553
	KEL	3526349005	3083517500	2827979300	2773327573	4061624968
	BTPL	12303	12107	17230	13171	12950
	Total	202350379330	190224731097	195572033627	107847448128	257540756215
	PESCO	316.45	315.40	261.65	160.60	170.10
	TESCO	0.12	0.10	0.13	n.p.	n.p.
System	IESCO	0.05	0.04	0.03	0.03	0.04
Average	GEPCO	10.53	10.41	35.44	3.26	30.97
Interruption	LESCO	78.04	52.49	45.79	37.44	32.92
Frequency	FESCO	35.40	46.54	32.41	39.99	38.87
Index (SAIFI),	MEPCO	201.53	177.61	203.00	235.00	316.22
Power Supply	HESCO	229.93	202.33	184.00	188.40	180.74
interruptions	SEPCO	251.48	227.96	216.71	601.37	568.59
per consumer	QESCO	144.95	112.58	107.00	96.92	95.18
per year	KEL	24.71	22.21	20.52	19.60	17.55
	BTPL	0.006	0.0095	0.01	0.0028	0.0028

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	DISCO	2013-14	2014-15	2015-16	2016-17	2017-18
	PESCO	27946.60	27934.98	24927.12	14643.00	16222.79
	TESCO	2.09	1.32	2.10	n.p.	n.p.
System	IESCO	1.66	0.10	0.82	0.79	0.73
Average	GEPCO	13.14	13.20	59.49	55.03	53.67
Interruption	LESCO	4759.61	3010.29	2926.29	5595.63	4338.23
Duration Index	FESCO	1137.02	2682.58	1714.00	1532.04	1951.38
(SAIDI), Power	MEPCO	17704.58	15677.65	17592.00	20411.32	26822.35
Supply	HESCO	16678.66	10642.74	12623.00	12799.12	12292.57
Interruptions	SEPCO	2442.73	2141.36	1879.31	5666.01	4397.44
Durations	QESCO	11868.07	7506.81	7290.00	8310.40	8287.90
	KEL	1495.25	1330.30	1210.00	1142.50	1451.42
	BTPL	0.78	1.43	1.72	0.5686	0.484

Source: Distribution Companies / KEL / BTPL / NEPRA

# TABLE 61Status of Grid Stations (Nos.)

0	As on		132 kV			66 kV	• •		33 kV		
sc	30 th	DISCO	Cons.	Sub-	DISCO	Cons.	Sub-	DISCO	Cons.	Sub-	Total
D	June	Owned	Owned	Total	Owned	Owned	Total	Owned	Owned	Total	
	2014	67	9	76	17	0	17	4	0	4	97
0	2015	67	9	76	17	0	17	4	0	4	97
SC	2016	67	9	76	17	0	17	5	0	5	98
Б	2017	69	9	78	16	0	16	7	0	7	101
	2018	73	9	82	16	0	16	6	0	6	104
	2014	7	0	7	8	0	8	0	0	0	15
0	2015	7	0	7	8	0	8	0	0	0	15
SC	2016	8	0	8	8	0	8	0	0	0	16
Ë	2017	8	0	8	8	0	8	0	0	0	16
	2018	9	0	9	9	0	9	0	0	0	18
	2014	73	20	93	7	1	8	3	0	3	104
ο	2015	77	22	99	5	1	6	3	0	3	108
SC	2016	77	22	99	4	1	5	3	0	3	107
ш	2017	77	24	101	4	1	5	3	0	3	109
	2018	78	25	103	4	1	5	2	0	2	110
o	2014	50	0	50	5	0	5	0	0	0	55
	2015	52	0	52	4	0	4	0	0	0	56
PC	2016	54	0	54	4	0	4	0	0	0	58
IJ	2017	55	0	55	4	0	4	0	0	0	59
	2018	59	0	59	1	0	1	0	0	0	60
	2014	85	31	116	8	0	8	0	0	0	124
0	2015	88	34	122	7	0	7	0	0	0	129
SC	2016	93	35	128	7	0	7	0	0	0	135
3	2017	98	38	136	5	0	5	0	0	0	141
	2018	108	42	150	0	0	0	0	0	0	150
	2014	60	16	76	23	0	23	0	0	0	99
0	2015	62	18	80	23	0	23	0	0	0	103
SC	2016	64	18	82	22	0	22	0	0	0	104
Ħ	2017	67	18	85	21	0	21	0	0	0	106
	2018	74	19	93	14	0	14	0	0	0	107
	2014	92	8	100	22	0	22	0	0	0	122
0	2015	96	8	104	21	0	21	0	0	0	125
EP(	2016	98	8	106	20	0	20	0	0	0	126
Σ	2017	104	9	113	16	0	16	0	0	0	129
	2018	104	9	113	16	0	16	0	0	0	129

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## 

0	As on		132 kV			66 kV			33 kV		
S	30 th	DISCO	Cons.	Sub-	DISCO	Cons.	Sub-	DISCO	Cons.	Sub-	Total
⊡	June	Owned	Owned	Total	Owned	Owned	Total	Owned	Owned	Total	
	2014	52	6	58	19	0	19	0	0	0	77
0	2015	53	6	59	18	0	18	0	0	0	77
ESC	2016	54	6	60	18	0	18	0	0	0	78
Ī	2017	59	6	65	15	0	15	0	0	0	80
	2018	61	7	68	15	0	15	0	0	0	83
	2014	47	1	48	12	1	13	0	0	0	61
0	2015	53	1	54	11	1	12	0	0	0	66
N N	2016	54	1	55	11	1	12	0	0	0	67
S	2017	54	1	55	12	1	13	0	0	0	68
	2018	55	1	56	9	1	10	0	0	0	66
	2014	56	0	56	10	0	10	26	0	26	92
0	2015	58	0	58	10	0	10	25	0	25	93
S S	2016	64	0	64	8	0	8	23	0	23	95
ð	2017	65	0	65	9	0	9	30	0	30	104
	2018	69	0	69	5	0	5	32	0	32	106
	2014	53	9	62	3	0	3	0	0	0	65
Ι.	2015	54	9	63	3	0	3	0	0	0	66
<b>E</b>	2016	54	9	63	3	0	3	0	0	0	66
-	2017	54	9	63	3	0	3	0	0	0	66
	2018	54	9	63	3	0	3	0	0	0	66
	2014	589	91	680	131	2	133	33	0	33	846
505	2015	613	98	711	124	2	126	32	0	32	869
tal PC ste	2016	633	99	732	119	2	121	31	0	31	884
S B J	2017	656	105	761	110	2	112	40	0	40	913
	2018	690	112	802	89	2	91	40	0	40	933

Source: Distribution Companies / KEL

			DISCOs'	Power Ti	ansform	<u>ıers, Capaci</u>	ities and Lo	ading Posi	tions of Pov	ver Tran	<u>sformers</u>			
03	As on		No. of	Power			Capacity	of Power			No. of O	ver-Loade	ed Power	
SI	30		Transfo	ormers			Transform	ers (MVA)			Transfor	mers (abc	ove 80%)	
D	June	132 kV	66 kV	33 kV	Total	132 kV	66 kV	33 kV	Total	132 kV	66 kV	33 kV	Total	% age
(	2015	173	32	7	212	4,556.80	305.95	25.50	4,888.25	94	17	4	115	54.25
00	2016	180	32	ω	220	4,929.80	305.95	29.50	5,265.25	104	16	4	124	56.36
SBo	2017	189	31	10	230	5,449.50	286.25	37.50	5,773.25	93	16	4	113	49.13
4	2018	198	30	8	236	5,768.50	286.25	32.00	6,086.75	107	12	9	125	52.97
(	2015	21	17	0	38	422.30	190.80	00.0	613.10	8	10	0	18	47.37
00	2016	18	17	0	35	500.30	205.40	00.0	705.70	8	9	0	14	40.00
SEL	2017	17	18	1	36	391.00	208.00	6.90	605.90	10	3	1	14	38.89
L	2018	18	19	١	38	417.00	208.00	06.9	631.90	8	5	L	14	36.84
	2015	172	14	7	193	4,192.80	133.60	30.00	4,356.40	20	L	٤	24	12.44
00	2016	173	14	7	194	4,218.80	133.60	30.00	4,382.40	34	2	Ļ	37	19.07
SE	2017	185	6	ω	202	4,663.10	91.30	33.00	4,787.40	24	0	0	24	11.88
1	2018	232	11	5	248	5,832.00	150.00	20.00	6,002.00	0	0	2	2	0.81
(	2015	137	6	0	146	3,598.80	103.00	00.0	3,701.80	62	9	0	68	46.58
22	2016	145	6	0	154	4,016.80	103.00	00.0	4,119.80	55	8	0	63	40.91
d39	2017	150	10	0	160	4,330.80	103.00	00.0	4,433.80	26	ω	0	34	21.25
9	2018	172	2	0	174	4,820.80	26.00	00.0	4,846.80	50	1	0	51	29.31
•	2015	293	17	0	310	8,005.00	215.30	00.0	8,220.30	160	13	0	173	55.81
00	2016	316	17	0	333	8,972.00	215.30	0.00	9,187.30	139	12	0	151	45.35
SE	2017	337	14	0	351	9,673.00	176.30	0.00	9,849.30	117	10	0	14	3.99
	2018	371	19	0	390	10,648.93	234.78	0.00	10,883.71	14	0	0	14	3.59
•	2015	142	41	0	183	3,755.00	450.45	00.0	4,205.45	06	20	0	110	60.11
00	2016	150	38	0	188	4,033.00	425.60	00.0	4,458.60	85	22	0	107	56.91
S∃:	2017	160	35	0	195	4,506.00	401.10	00.0	4,907.10	82	18	0	100	51.28
1 10	2018	200	25	0	225	5,318.00	278.70	00.0	5,596.70	35	7	0	42	18.67
C	2015	213	34	0	247	5,539.00	373.00	00.00	5,912.00	26	22	0	119	48.18
)))a	2016	234	35	0	269	6,210.80	378.34	0.00	6,589.14	97	21	0	118	43.87
131	2017	253	29	0	282	7,179.30	292.84	0.00	7,472.14	65	10	0	75	26.60
J	2018	262	30	0	292	7,514.91	322.91	00.0	7,837.82	64	L	0	65	22.26
(	2015	85	24	0	109	1,753.40	237.10	00.0	1,990.50	62	10	0	72	66.06
22	2016	87	22	0	109	1,833.40	211.10	0.00	2,044.50	29	L	0	74	67.89
SEF	2017	102	17	0	119	2,264.90	146.10	0.00	2,411.00	54	5	0	59	49.58
1	2018	105	16	0	121	2,430.40	133.10	0.00	2,563.50	45	4	0	49	40.50
(	2015	89	27	1	117	1,950.80	269.80	6.30	2,226.90	24	8	0	32	27.35
220	2016	91	24	1	116	1,989.30	237.40	6.30	2,233.00	28	5	0	33	28.45
33S	2017	60	27	1	118	2,073.80	269.80	6.30	2,349.90	41	12	0	53	44.92
5	2018	106	19	l	126	2,534.30	215.40	6.30	2,756.00	42	7	0	49	38.89

TABLE 62 ower Transformers, Capacities and Loading Positions of Power Tran

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005	As on 30 th		No. of Transf	Power			Capacity Transform	of Power ers (MVA)			No. of Ov Transfori	/er-Loade mers (abo	d Power ve 80%)	
DI	June	132 kV	66 kV	33 kV	Total	132 kV	66 kV	33 kV	Total	132 kV	66 kV	33 kV	Total	% age
0	2015	118	14	0	132	2,596.60	109.50	00.0	2,706.10	63	6	0	72	54.55
225	2016	102	14	6	125	2,294.00	85.00	114.00	2,493.00	27	6	0	99	52.80
SES	2017	110	14	36	160	2,631.00	122.00	144.00	2,897.00	65	10	0	75	46.88
5	2018	126	6	40	175	3,092.00	78.00	160.00	3,330.00	50	5	0	55	31.43
	2015	126	ŝ	0	129	4,651.50	69.00	00.0	4,720.50	42	0	0	42	32.56
73	2016	132	ŝ	0	135	5,053.50	00.69	00.0	5,122.50	31	0	0	31	22.96
К	2017	135	ŝ	0	138	5,195.50	00.69	00.0	5,264.50	26	1	0	57	41.30
	2018	144	ŝ	0	147	5,449.50	00'69	00.0	5,518.50	47	1	0	48	32.65
L U U	2015	1,443	229	15	1,687	36,370.50	2,388.50	61.80	38,820.80	680	116	7	803	47.60
นอ: วว ๆ ๆ	2016	1,496	222	25	1,743	38,998.20	2,300.69	179.80	41,478.69	674	108	5	787	45.15
yst ots	2017	1,593	204	56	1,853	43,162.40	2,096.69	227.70	45,486.79	577	92	Ŋ	561	30.28
S J L	2018	1,790	180	55	2,025	48,376.84	1,933.14	225.20	50,535.18	415	42	6	466	23.01
Source:	Distributio	n Companie	s / KEL											

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	As on 30 th	Ī				Total HT	Total IT Lines
DISCO	June	132 kV	66 kV	33 kV	11 kV	Lines	(0.4  kV)
	2014	2,147	841	311	33,337	36,636	43,801
0	2015	2,164	841	312	33,464	36,781	43,999
Š	2016	2,209	841	312	33,785	37,147	44,330
Б	2017	2,245	802	312	35,751	39,110	44,574
	2018	2,318	802	312	36,227	39,659	44,954
	2014	259	383	-	7,363	8,005	6,378
0	2015	259	383	-	7,746	8,388	6,532
SC	2016	359	383	-	7,765	8,507	6,532
Ë	2017	359	402	-	7,768	8,529	6,532
	2018	359	402	-	8,023	8,784	6,590
	2014	2,717	581	153	23,596	27,047	26,009
0	2015	2,772	581	153	24,272	27,778	26,145
ŠČ	2016	2,897	581	153	24,607	28,238	26,286
ш	2017	2,897	581	69	24,833	28,380	26,499
	2018	2,897	581	69	25,156	28,703	26,775
	2014	2,054	332	-	22,216	24,602	18,087
0	2015	2,233	447	-	22,468	25,148	18,227
0	2016	2,349	447	-	22,604	25,400	18,320
5	2017	2,354	447	-	22,718	25,519	18,446
	2018	2,425	179	-	22,861	25,465	18,410
	2014	2,572	-	-	26,657	29,229	14,730
0	2015	2,252	429	-	27,095	29,776	14,808
SC	2016	2,425	429	-	27,921	30,775	14,819
	2017	2,554	410	-	28,079	31,043	14,819
	2018	2,864	410	-	28,201	31,475	14,900
	2014	1,844	1,260	-	38,093	41,197	25,770
0	2015	1,865	1,260	-	38,614	41,739	25,965
SC	2016	2,014	1,260	-	39,266	42,540	28,036
Ë	2017	2,242	1,280	-	42,083	45,605	29,702
	2018	2,402	1,174	-	42,773	46,349	30,203
	2014	3,169	1,154	-	69,453	73,776	46,251
8	2015	3,286	1,154	-	71,102	75,542	46,866
Eb	2016	3,305	1,048	-	71,971	76,324	47,204
Σ	2017	3,538	977	-	72,899	77,414	47,723
	2018	3,749	935	-	74,061	78,745	48,560
	2014	2,067	975	-	26,612	29,654	14,392
8	2015	2,133	975	-	26,914	30,022	14,690
ES	2016	2,158	957	-	27,850	30,965	14,833
Т	2017	2,445	899	-	28,055	31,399	14,892
	2018	2,496	687	-	28,154	31,337	14,959
	2014	1,900	753	-	24,277	26,930	13,471
8	2015	1,995	753	-	24,192	26,940	13,471
ED	2016	2,017	733	-	23,880	26,630	13,348
S	2017	2,135	733	-	24,449	27,317	13,497
	2018	2,137	733	-	25,140	28,010	13,492
	2014	4,299	491	985	33,425	39,200	14,373
8	2015	4,299	491	985	34,179	39,954	14,654
Ē	2016	4,299	502	985	35,086	40,872	14,958
ø	2017	4,963	472	1,981	36,088	43,504	15,577
	2018	5,200	260	1,981	37,779	45,220	16,155

TABLE 63 Status of Distribution Lines (km)

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DISCO	As on 30 th June	132 kV	66 kV	33 kV	11 kV	Total HT Lines	Total LT Lines (0.4 kV)
	2014	761	149	-	8,335	9,245	17,645
	2015	762	149	-	8,834	9,745	17,645
EI (EI	2016	762	149	-	9,247	10,158	18,000
_	2017	766	149	-	9,363	10,278	19,962
	2018	767	149	-	9,549	10,465	19,098
	2014	23,028	6,770	1,449	305,029	336,276	223,262
3 <u>0</u> 2.	2015	23,258	7,314	1,450	310,046	342,068	225,357
tal PC ste	2016	24,032	7,181	1,450	314,735	347,398	228,666
S I S	2017	25,732	7,003	2,362	322,723	357,820	232,261
	2018	26,847	6,163	2,362	328,375	363,747	234,998

Source: Distribution Companies / KEL

TABLE 64Feeders Outages Statistics of DISCOs (2017-18)

0	Nature	132 kV	Feeders	66 kV	Feeders	33 kV I	Feeders	11 kV	Feeders	All F	eeders
SC	of	No. of	Duration								
D	Tripping	Tripping	(Min.)								
0	Planned	493	125028	111	36567	17	8395	23139	1585159	23760	1755149
SC	Forced	254	29552	134	15375	22	495	28085	1994671	28495	2040093
Ы	Total	747	154580	245	51942	39	8890	51224	3579830	52255	3795242
0	Planned	5	3235	1	50	3	230	3650	49710	3659	53225
SC	Forced	60	4815	70	5603	35	610	2246	22034	2411	33062
Ë	Total	65	8050	71	5653	38	840	5896	71744	6070	86287
0	Planned	188	62580	20	9600	0	0	405222	25485401	405430	25485609
ŠČ	Forced	0	0	0	0	0	0	5037	313606	5037	313606
Ш	Total	188	62580	20	9600	0	0	410259	25799007	410467	25799215
0	Planned	14	4525	6	1020	0	0	1595	104720	1615	104740
PC DC	Forced	156	30850	47	1944	0	0	1272	48048	1475	80842
B	Total	170	35375	53	2964	0	0	2867	152768	3090	185582
0	Planned	431	150616	6	2264	0	0	0	0	437	152880
SC	Forced	5627	288332	353	21261	0	0	0	0	5980	309593
ш	Total	6058	438948	359	23525	0	0	0	0	6417	462473
0	Planned	318	67584	118	23480	0	0	11013	1293752	11449	1384816
SC	Forced	81	13575	33	104	0	0	62084	829931	62198	843610
H	Total	399	81159	151	23584	0	0	73097	2123683	73647	2228426
0	Planned	966	277634	132	60345	0	0	4911	294660	6009	632639
Ä	Forced	449	62665	60	8926	0	0	247131	14827860	247640	14899451
Μ	Total	1415	340299	192	69271	0	0	252042	15122520	253649	15532090
0	Planned	41	15971	28	10595	0	0	42	15120	111	41686
S	Forced	487	97147	24	14168	0	0	68238	667320	68749	778635
Ï	Total	528	113118	52	24763	0	0	68280	682440	68860	820321
0	Planned	1127	607756	197	72661	0	0	3162	1124094	4486	1804511
Ы	Forced	372	1157667	152	34218	0	0	85854	25291116	86378	26483001
SE	Total	1499	1765423	349	106879	0	0	89016	26415210	90864	28287512
0	Planned	112	21430	16	2215	105	2317	3722	458479	3955	484441
S	Forced	63	6173	5	127	0	0	12560	241510	12628	247810
ß	Total	175	27603	21	2342	105	2317	16282	699989	16583	732251
	Planned	7	4855	0	0	0	0	9091	2936745	9098	2941600
(EL	Forced	26	2451	0	0	0	0	23023	1885455	23049	1887906
-	Total	33	7306	0	0	0	0	32114	4822200	32147	4829506

Source: Distribution Companies / KEL

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0		Nur	nber of Ove	rloaded Feed	ders	Num	ber of Unde	rutilized Fee	eders
ISO	Year	(/	Above Desig	ned Capacit	y)	(109	<u>% Below Des</u>	igned Capa	city)
Δ		132 kV	66 kV	33 kV	11 kV	132 kV	66 kV	33 kV	11 kV
	2013-14	20	0	0	16	15	0	1	72
8	2014-15	2	0	0	56	6	2	0	111
ES	2015-16	2	0	0	65	7	0	0	90
٩	2016-17	3	0	0	36	6	0	1	108
	2017-18	5	0	0	38	7	0	1	113
	2013-14	2	2	0	0	0	2	0	72
8	2014-15	2	2	0	0	2	2	0	17
ES	2015-16	2	2	0	0	2	1	0	20
F	2016-17	2	2	0	0	2	1	0	20
	2017-18	2	3	0	0	2	1	0	23
	2013-14	0	0	0	36	5	0	0	68
0	2014-15	1	0	0	39	5	0	0	310
S	2015-16	20	0	0	12	4	1	0	41
=	2016-17	14	1	0	4	0	0	0	12
	2017-18	8	0	0	0	0	0	0	8
	2013-14	5	0	0	45	9	1	0	589
8	2014-15	2	0	0	3	3	0	0	81
Д	2015-16	0	0	0	6	4	0	0	50
ច	2016-17	1	0	0	1	2	0	0	52
	2017-18	1	0	0	1	12	0	0	65
	2013-14	80	0	0	0	19	0	0	0
0	2014-15	83	5	0	0	13	0	0	0
S	2015-16	77	7	0	38	99	6	0	230
	2016-17	86	4	0	100	116	0	0	315
	2017-18	103	2	0	105	20	0	0	318
	2013-14	2	0	0	248	6	0	0	107
0	2014-15	1	0	0	7	12	0	0	41
S	2015-16	2	1	0	8	15	0	0	63
Ë	2016-17	2	1	0	2	16	0	0	64
	2017-18	0	0	0	1	13	0	0	15
	2013-14	8	1	0	237	28	6	0	571
8	2014-15	5	1	0	371	15	0	0	76
Ъ.	2015-16	7	2	0	472	9	1	0	81
Σ	2016-17	4	1	0	491	1	1	0	86
	2017-18	3	0	0	442	5	0	0	78
	2013-14	5	0	0	14	8	1	0	51
0	2014-15	4	0	0	24	8	0	0	47
S	2015-16	4	0	0	22	17	2	0	36
Ï	2016-17	1	0	0	34	7	0	0	54
	2017-18	2	0	0	0	7	0	0	40
	2013-14	4	2	0	84	5	0	0	52
0	2014-15	4	1	0	125	4	0	0	21
ЪС	2015-16	5	0	0	71	3	0	0	42
SE	2016-17	1	1	0	79	9	1	0	41
	2017-18	0	1	0	86	3	0	0	33

 TABLE 65

 Overloaded and Underutilized Distribution Feeders

## 

sco	Year	Nui (/	nber of Ove Above Desig	rloaded Fee ned Capacit	ders y)	Num (109	ber of Unde % Below Des	rutilized Fee	eders city)
⊡		132 kV	66 kV	33 kV	11 kV	132 kV	66 kV	33 kV	11 kV
	2013-14	0	0	0	0	4	0	0	13
0	2014-15	0	0	0	0	0	0	0	0
S	2015-16	0	0	0	0	0	0	0	0
ð	2016-17	0	0	0	0	0	0	0	0
	2017-18	0	0	0	0	0	0	0	0
	2013-14	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
	2014-15	n.p.	n.p.	n.p.	25	n.p.	n.p.	n.p.	69
(EL	2015-16	n.p.	n.p.	n.p.	1	n.p.	n.p.	n.p.	20
_	2016-17	n.p.	n.p.	n.p.	1	n.p.	n.p.	n.p.	15
	2017-18	n.p.	n.p.	n.p.	1	n.p.	n.p.	n.p.	6

Source: Distribution Companies / KEL

#### TABLE 66

DISCO	Os' Numb	er of Distributi	on Transformers, Cap	acities and	Loading Posi	itions of Dis	tribution Tra	ansformers
0	As on	No. of	Capacity of	Loading	g Position of	Distribution	Transformer	s (Nos.)
DISC	30 th June	Distribution Transformers	Distribution Transformers (kVA)	80-90%	91-100%	Above 100%	Total	%age
	2015	58,458	4,461,200	16,	343	4,358	20,701	35.41
U U U	2016	60,365	5,219,525	15,	221	4,090	19,311	31.99
ES S	2017	72,078	5,594,115	11,235	5,321	4,477	21,033	29.18
_	2018	74,104	5,741,775	3,183	924	2,076	6,183	8.34
	2015	15,634	1,200,000	-	-	-	-	-
U U U	2016	15,634	1,200,000	71	103	-	174	1.11
E	2017	18,198	1,214,960	0	0	0	0	0.00
	2018	18,475	1,259,110	0	0	0	0	0.00
-	2015	44,811	3,707,000	1,441	958	34	2,433	5.43
8	2016	45,438	3,754,000	1,990	1,051	64	3,105	6.83
IES	2017	46,359	3,832,000	1,830	990	48	2,868	6.19
	2018	47,830	3,934,000	2,516	996	258	3,770	7.88
	2015	58,193	3,587,000	2,597	2,308	1,731	6,636	11.40
Ŭ	2016	60,080	3,730,820	905	428	215	1,548	2.58
19	2017	61,661	3,828,990	863	410	202	1,475	2.39
•	2018	64,344	4,087,000	908	606	227	1,741	2.71
	2015	96,268	7,501,615	19,254	9,627	9,627	38,508	40.00
U U U	2016	97,048	7,476,000	16,426	9,240	16,286	41,952	43.23
LES	2017	100,718	7,796,585	14,649	9,448	6,253	30,350	30.13
	2018	105,185	8,230,625			2,950	2,950	2.80
	2015	93,376	6,143,420	1,882	1,288	236	3,406	3.65
U U U	2016	97,761	6,493,910	1,478	1,183	624	3,285	3.36
FES	2017	100,276	6,626,000	1,176	540	127	1,843	1.84
	2018	104,058	6,874,000	199	165	28	392	0.38
0	2015	149,368	7,392,855	3,965	1,652	991	6,608	4.42
ŭ	2016	152,806	7,587,225	2,984	1,990	2,131	7,105	4.65
161	2017	156,460	7,799,800	3,540	2,530	2,058	8,128	5.19
~	2018	161,197	8,034,290	2,337	1,630	1,877	5,844	3.63
0	2015	34,443	1,687,795	3,986	2,029	1,207	7,222	20.97
Ŭ ŭ	2016	35,334	1,729,350	3,540	3,438	1,358	8,336	23.59
Ψ	2017	35,996	1,761,620	2,004	1,336	0	3,340	9.28
-	2018	36,670	1,807,275	320	212	0	532	1.45

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0	As on	No. of	Capacity of	Loadin	g Position of	Distribution	Transformer	s (Nos.)
DISC	30 th June	Distribution Transformers	Distribution Transformers (kVA)	80-90%	91-100%	Above 100%	Total	%age
	2015	34,856	1,932,340	2,559	1,679	784	5,022	14.41
ğ	2016	35,029	1,947,465	3,707	1,814	922	6,443	18.39
ЕР	2017	35,875	2,004,370	3,885	1,942	1,597	7,424	20.69
•	2018	37,562	2,097,125	1,980	993	763	3,736	9.95
	2015	51,886	2,571,468	4,125	2,350	1,807	8,282	15.96
U U U	2016	53,646	2,643,795	4,081	2,725	1,937	8,743	16.30
SES	2017	55,770	2,752,000	4,191	2,735	1,947	8,873	15.91
0	2018	59,336	3,049,830	4,042	2,193	859	7,094	11.96
	2015	20,979	6,047,850	468	185	76	729	3.47
	2016	23,321	6,302,340	416	165	67	648	2.78
Y	2017	25,667	7,230,425	354	140	57	551	2.15
	2018	27,388	7,463,855	318	126	34	478	1.75
5 0 5	2015	637,293	40,184,693	56,152	21,891	20,775	98,818	15.51
ten CC	2016	653,141	41,782,090	50,403	21,972	27,627	100,002	15.31
ota PEP	2017	683,391	43,210,440	43,373	25,252	16,709	85,334	12.49
F - 2	2018	708,761	45,115,030	15,485	7,719	9,038	32,242	4.55

Source: Distribution Companies / KEL

TABLE 67 Village Electrification in all Distribution Companies

DISCO	As on 30 th June	Total Number of Villages	Total Villages Electrified	Percentage of Total Electrified Villages
	2014	26,387	20,554	77.89
0	2015	27,817	20,961	75.35
SC	2016	28,844	22,202	76.97
ä	2017	30,098	23,664	78.62
	2018	31,559	24,688	78.23
	2014	58	38	65.52
0	2015	397	19	4.79
sc	2016	397	30	7.56
Ë	2017	452	200	44.25
	2018	452	250	55.31
	2014	2,717	2,109	77.62
0	2015	537	270	50.28
sc	2016	700	266	38.00
₩	2017	586	271	46.25
	2018	1,863	941	50.51
	2014	6,854	6,854	100.00
0	2015	6,977	6,886	98.70
<u>N</u>	2016	7,070	7,013	99.19
5	2017	7,070	7,013	99.19
	2018	7,550	7,508	99.44
	2014	3,913	2,728	69.72
0	2015	3,913	2,859	73.06
SC	2016	4,159	2,976	71.56
	2017	4,159	2,976	71.56
	2018	4,405	3,171	71.99
	2014	22,930	21,505	93.79
0	2015	23,277	21,831	93.79
SC	2016	25,325	22,499	88.84
법 같다.	2017	26,069	22,890	87.81
1	2018	26,213	25,465	97.15

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DISCO	As on 30 th June	Total Number of Villages	Total Villages Electrified	Percentage of Total Electrified Villages
	2014	25,055	21,240	84.77
0	2015	26,310	22,287	84.71
PC	2016	28,618	24,595	85.94
Σ	2017	31,651	26,315	83.14
	2018	37,400	30,364	81.19
	2014	23,803	16,424	69.00
0	2015	23,803	17,010	71.46
SC	2016	23,803	17,643	74.12
Ī	2017	23,803	18,147	76.24
	2018	23,803	18,634	78.28
	2014	23,263	16,189	69.59
0	2015	23,263	16,515	70.99
DG	2016	23,263	16,949	72.86
SE	2017	23,263	17,365	74.65
	2018	23,263	17,961	77.21
	2014	23,819	17,517	73.54
o	2015	23,819	18,017	75.64
SC	2016	23,819	19,559	82.12
ð	2017	23,819	21,586	90.63
	2018	26,243	24,806	94.52
	2014	889	661	74.35
	2015	889	702	78.97
KEI	2016	889	747	84.03
_	2017	889	821	92.35
	2018	889	883	99.33
	2014	158,799	125,158	78.82
3 O E	2015	160,113	126,655	79.10
tal EPC ste	2016	165,998	133,732	80.56
Sy PE	2017	170,970	140,427	82.14
	2018	182,751	153,788	84.15

Source: Distribution Companies / KEL

TABLE 68

	Abb	Sucations of New Co	mections Received, El	lergized and Pendi	ng
	Voor	Applications	Conne	ection	Applications
DISCO	Tear	Received (Nos.)	Sanctioned (Nos.)	Load (kW)	Pending (Nos.)
	2013-14	106,014	82,407	188,240	23,607
0	2014-15	126,970	103,848	217,731	23,122
S.	2015-16	127,476	109,693	260,302	17,783
E E	2016-17	132,615	113,460	286,783	19,155
	2017-18	145,351	136,322	322,728	9,029
	2013-14	609	63	258	546
0	2014-15	641	162	285	479
S:	2015-16	722	722	793	0
l H	2016-17	322	24	702	298
	2017-18	1,093	75	15,402	1,018
	2013-14	96,265	70,856	211,278	25,409
0	2014-15	113,855	81,831	232,254	32,024
Š	2015-16	131,842	106,462	215,332	25,380
Ш.	2016-17	139,665	109,675	266,940	29,990
	2017-18	170,522	158,303	379,853	12,219

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DISCO	Veer	Applications	Connee	ction	Applications		
DISCO	Year	Received (Nos.)	Sanctioned (Nos.)	Load (kW)	Pending (Nos.)		
	2013-14	105,194	94,033	205,952	11,161		
0	2014-15	126,534	99,735	241,546	26,799		
l ä	2015-16	155,317	130,749	295,808	24,568		
5	2016-17	157,741	119,443	265,263	38,298		
	2017-18	197,055	178,431	471,122	18,624		
	2013-14	215,984	146,229	491,192	69,755		
0	2014-15	244,111	187,150	531,864	56,961		
S:	2015-16	262,030	202,715	617,966	59,315		
	2016-17	269,096	175,820	535,978	93,276		
	2017-18	373,934	315,557	961,958	58,377		
	2013-14	118,884	90,352	314,228	28,532		
0	2014-15	125,998	146,683	500,790	-20,685		
SC	2015-16	146,262	129,310	411,525	16,952		
<b>H</b>	2016-17	237,548	136,309	474,474	101,239		
	2017-18	330,695	261,795	714,631	68,900		
	2013-14	258,882	181,169	389,886	77,713		
0	2014-15	271,874	249,632	517,342	22,242		
l ä	2015-16	274,755	271,735	625,712	3,020		
Σ	2016-17	303,128	297,447	682,824	5,681		
	2017-18	432,931	372,907	1,129,124	60,024		
	2013-14	39,240	36,833	63,415	2,407		
0	2014-15	21,445	24,625	83,803	-3,180		
Si Si	2015-16	27,915	31,825	94,710	-3,910		
Ĩ	2016-17	28,595	28,504	115,520	91		
	2017-18	28,412	28,377	104,687	35		
	2013-14	17,165	15,609	85,220	1,556		
0	2014-15	11,832	10,196	32,819	1,636		
<u> </u>	2015-16	13,484	10,786	36,254	2,698		
S	2016-17	9,316	7,511	25,982	1,805		
	2017-18	8,818	8,440	47,439	378		
	2013-14	23,848	18,460	31,048	5,388		
0	2014-15	16,455	13,762	15,524	2,693		
S S	2015-16	14,939	11,929	1,832	3,010		
ð	2016-17	17,321	13,739	1,952	3,582		
	2017-18	18,417	17,452	26,198	965		
	2013-14	12,174	10,955	280,576	1,219		
.	2014-15	25,242	22,266	348,310	2,976		
(EL	2015-16	17,956	14,075	300,391	3,881		
<b>—</b>	2016-17	26,532	25,497	319,913	1,035		
	2017-18	32,847	107,968*	407,853	6,861		

* 2018 data is based on number of connections provided, instead of past practice of number of applications. Source: Distribution Companies / KEL

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Province-wise Electricity Consumption by Economic Groups of the Country (GWh)												
Category	Year	Punjab [*]	Sindh ^{**}	Khyber Pakhtunkhwa [#]	Balochistan ^{##}	K-Electric Limited	Total					
	2013-14	23593.56	3723.74	5429.75	575.25	5489.00	38811.30					
	2014-15	24681.41	3654.19	5269.14	573.16	6150.00	40327.90					
Domestic	2015-16	27540.44	3444.46	5362.79	593.60	6596.00	43537.29					
	2016-17	31075.42	3805.50	5900.49	637.07	6643.00	48061.48					
	2017-18	35216.44	4101.62	6123.36	672.30	7170.00	53283.72					
	2013-14	3630.77	428.49	631.54	101.70	1507.00	6299.50					
	2014-15	3633.69	435.21	660.06	108.93	1600.00	6437.89					
Commercial	2015-16	4105.03	481.53	710.11	114.76	1685.00	7096.43					
	2016-17	4699.82	543.51	746.36	124.94	1655.00	7769.63					
	2017-18	5312.42	534.00	775.86	131.05	1758.00	8511.33					
	2013-14	17177.22	1187.62	2051.72	134.24	3568.00	24118.80					
	2014-15	17678.02	1172.43	2082.87	140.00	3844.00	24917.32					
Industrial	2015-16	17724.41	1243.35	2043.90	136.09	3830.00	24977.75					
	2016-17	16476.36	1160.39	2276.76	153.09	3885.00	23951.60					
	2017-18	19326.63	1224.95	2549.55	173.04	4124.00	27398.17					
	2013-14	4444.24	688.83	159.42	2837.00	160.00	8289.49					
	2014-15	3995.48	642.24	144.51	3067.74	166.00	8015.97					
Agricultural	2015-16	4313.30	659.00	126.60	3263.37	163.00	8525.27					
9	2016-17	4867.26	645.65	132.82	3417.43	159.00	9222.16					
	2017-18	5476.40	617.96	120.91	3762.35	151.00	10128.62					
	2013-14	211.42	162.18	14.07	2.23	106.00	495.90					
	2014-15	200.26	173.97	14.17	2.91	110.00	501.31					
Public	2015-16	199.66	78.27	12.87	3.84	163.00	457.64					
Lighting	2016-17	205.59	74.55	13.24	4.92	187.00	485.30					
	2017-18	232.30	64.93	13.47	8.25	157.00	475.95					
	2013-14	3005.27	191.10	546.23	93.95	427.00	4263.55					
	2014-15	3033.89	184.21	526.97	101.00	410.00	4256.07					
Bulk Supply	2015-16	2501.45	241.99	287.35	108.11	412.00	3550.90					
	2016-17	2472.40	271.10	587.30	115.02	433.00	3878.82					
	2017-18	3958.33	282.58	651.09	122.16	471.00	5485.16					
	2013-14	24.34	4.42	2.60	0.04	197.00	228.40					
	2014-15	25.30	5.28	2.38	0.06	13.00	46.02					
Others	2015-16	861.49	5.16	267.77	0.07	15.00	1149.49					
	2016-17	1143.25	5.16	2.19	0.11	19.00	1169.71					
	2017-18	196.55	163.73	43.08	46.82	29.00	479.18					
	2013-14	52086.81	6386.38	8835.33	3744.41	11454.00	82506.93					
	2014-15	53248.05	6267.53	8700.10	3993.80	12293.00	84502.48					
Total	2015-16	57245.77	6153.76	8811.39	4219.84	12864.00	89294.76					
	2016-17	60940.10	6505.86	9659.16	4452.58	12981.00	94538.70					
	2017-18	69719.07	6989.77	10277.32	4915.97	13860.00	105762.13					

TABLE 69

* Islamabad Capital Territory is included

** Consumption in KEL Area is not included
## Area served by KEL is excluded

# FATA is included

Source: National Electric Power Regulatory Authority

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	FIOVUICE-V	vise Electricity	consumpt	ton by Economic	Groups of the t		
Category	Year	Punjab [*]	Sindh ^{**}	Khyber Pakhtunkhwa [#]	Balochistan ^{##}	K-Electric Limited	Total
	2013-14	45.30	58.31	61.45	15.36	47.92	47.04
	2014-15	46.35	58.30	60.56	14.35	50.03	47.72
Domestic	2015-16	48.11	55.97	60.86	14.07	51.27	48.76
	2016-17	50.99	58.49	61.09	14.31	51.17	50.84
	2017-18	50.51	58.68	59.58	13.68	51.73	50.38
	2013-14	6.97	6.71	7.15	2.72	13.16	7.64
	2014-15	6.82	6.94	7.59	2.73	13.02	7.62
Commercial	2015-16	7.17	7.82	8.06	2.72	13.10	7.95
	2016-17	7.71	8.35	7.73	2.81	12.75	8.22
	2017-18	7.62	7.64	7.55	2.67	12.68	8.05
	2013-14	32.98	18.60	23.22	3.59	31.15	29.23
	2014-15	33.20	18.71	23.94	3.51	31.27	29.49
Industrial	2015-16	30.96	20.20	23.20	3.23	29.77	27.97
	2016-17	27.04	17.84	23.57	3.44	29.93	25.34
	2017-18	27.72	17.52	24.81	3.52	29.75	25.91
	2013-14	8.53	10.79	1.80	75.77	1.40	10.05
	2014-15	7.50	10.25	1.66	76.81	1.35	9.49
Agricultural	2015-16	7.53	10.71	1.44	77.33	1.27	9.55
	2016-17	7.99	9.92	1.38	76.75	1.22	9.75
	2017-18	7.85	8.84	1.18	76.53	1.09	9.58
	2013-14	0.41	2.54	0.16	0.06	0.93	0.60
Dublic	2014-15	0.38	2.78	0.16	0.07	0.89	0.59
Lighting	2015-16	0.35	1.27	0.15	0.09	1.27	0.51
Lighting	2016-17	0.34	1.15	0.14	0.11	1.44	0.51
	2017-18	0.33	0.93	0.13	0.17	1.13	0.45
	2013-14	5.77	2.99	6.18	2.51	3.73	5.17
	2014-15	5.70	2.94	6.06	2.53	3.34	5.04
Bulk Supply	2015-16	4.37	3.93	3.26	2.56	3.20	3.98
	2016-17	4.06	4.17	6.08	2.58	3.34	4.10
	2017-18	5.68	4.04	6.34	2.48	3.40	5.19
	2013-14	0.05	0.07	0.03	0.00	1.72	0.28
	2014-15	0.05	0.08	0.03	0.00	0.11	0.05
Others	2015-16	1.50	0.08	3.04	0.00	0.12	1.29
	2016-17	1.88	0.08	0.02	0.00	0.15	1.24
	2017-18	0.28	2.34	0.42	0.95	0.21	0.45
	2013-14	100.00	100.00	100.00	100.00	100.00	100.00
	2014-15	100.00	100.00	100.00	100.00	100.00	100.00
Total	2015-16	100.00	100.00	100.00	100.00	100.00	100.00
	2016-17	100.00	100.00	100.00	100.00	100.00	100.00
	2017-18	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 70

Province-wise Electricity Consumption by Economic Groups of the Country (%)

* Islamabad Capital Territory is included

 $\nabla \nabla \nabla$ 

** Consumption in KEL Area is not included

## Area served by KEL is excluded

*[#] FATA is included* 

Source: National Electric Power Regulatory Authority

### **--- --- State of Industry Report 2018**

#### ELECTRICITY TARIFF

#### 14.1 GENERAL

The determination of tariff for electric power services is one of the primary responsibilities of NEPRA. NEPRA determines electricity tariff, keeping in view the principles of economic efficiency and service quality according to the prescribed NEPRA Tariff (Standards and Procedure) Rules, 1998. Under Section 7 (3) of the NEPRA Act, NEPRA has been expressly conferred the power to determine tariff, rates, charges and other terms and conditions for the supply of electric power services by generation, transmission and distribution companies and to recommend these to the Federal Government for notification.

#### 14.2 TARIFF SETTING

The procedures and standards in accordance with which tariffs are required to be determined, modified or revised are prescribed in the NEPRA Tariff (Standards and Procedure) Rules, 1998.

#### 14.3 TARIFF STANDARDS

- i) Tariffs should allow licensees the recovery of any and all costs prudently incurred to meet the demonstrated needs of their customers, provided that assessments of licensees' prudence may not be required where tariffs are set on other than cost-of-service basis, such as formula-based tariffs that are designed to be in place for more than one year;
- ii) Tariffs should generally be calculated by including a depreciation charge and a rate of return on the capital investment of each licensee commensurate to the earned by other investments of comparable risk;
- iii) Tariffs should allow licensees a rate of return which promotes continued reasonable investment in equipment and facilities for improved and efficient service;
- iv) Tariffs should include a mechanism to allow licensees a benefit from, and penalties for failure to achieve, the efficiencies in the cost of providing the service and the quality of service;
- v) Tariffs should reflect marginal cost principles to the extent feasible, keeping in view the financial stability of the sector;
- vi) The Authority shall have a preference for competition rather than regulation and shall adopt policies and establish tariffs towards that end;
- vii) The tariff regime should clearly identify interclass and inter-region subsides and shall provide such subsides transparently if found essential, with a view to minimizing if not eliminating them keeping in view the need for an adequate transition period;
- viii) Tariffs may be set below the level of cost of providing the service to consumers consuming electric power below the consumption levels determined for the purpose from time to time by the Authority, as long as such tariffs are financially sustainable;
- ix) Tariffs should, to the extent feasible, reflect the full cost of service to consumer groups with similar service requirements;
- x) Tariff should take into account Government subsidies or the need for adjustment to finance rural electrification in accordance with the policies of the Government;
- xi) The application of the tariffs should allow reasonable transition periods for the adjustments of tariffs to meet the standards and other requirements pursuant to the NEPRA Act including the performance standards, industry standards and the uniform codes of conduct;
- xii) Tariffs should seek to provide stability and predictability for customers; and
- xiii) Tariffs should be comprehensible, free of misinterpretation and shall state explicitly each component thereof.

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NEPRA is required to determine electricity tariff so as to protect the interest of the consumers as well as electric power producers/suppliers. Any raise in tariff requested by the producers/ suppliers of electricity has to be allowed or rejected by NEPRA after analyzing all the costs involved in the proposed sale price. For any determination of tariff, the following points are generally considered by NEPRA in addition to other points on a case-to-case basis:

i) Utility should be able to recover its costs with some surplus for capacity expansion or return on equity.

TABLE 71

ii) The average sale rate should provide for reasonable rate of return.

Statement of GOP Applicable (Notified) Tariff											
PARTICULARS	with effect from 05-08-2013 (except PESCO)		with effect from 11-10-2013		with effect from 01-10-2014*		with effect from 10-06-2015**		with effect from 21-03-2018		
	Fixed	Variable	Fixed	Variable	Fixed	Variable	Fixed	Variable	Fixed	Variable	
RESIDENTIAL											
For Sanctioned Load less than 5 kW											
Up to 50 Units		2.00		2.00		2.00		2.00		2.00	
For Consumption exceeding 50 Uni	ts										
01-100 Units		5.79		5.79		5.79		5.79		5.79	
101-200 Units				8.11		8.11		8.11		8.11	
201-300 Units		8.11		12.09		12.09		10.20		10.20	
301-700 Units		12.33		16.00		16.00		16.00		16.00	
Above 700 Units		15.07		18.00		18.00		18.00		18.00	
For Sanctioned Load 5 kW and above	/e										
Time of Use (TOU) - Peak		13.99		18.00		18.00		18.00		18.00	
Time of Use (TOU) - Off-Peak		8.22		12.50		12.50		12.50		12.50	
COMMERCIAL											
For Sanctioned Load less than 5 kW		18.00		18.00		18.00		18.00		18.00	
For Sanctioned Load 5 kW and above	/e										
Regular	400	16.00	400	16.00	400	16.00	400	16.00	400	16.00	
Time of Use (TOU) - Peak		18.00		18.00		18.00		18.00		18.00	
Time of Use (TOU) - Off-Peak	400	12.50	400	12.50	400	12.50	400	12.50	400	12.50	
INDUSTRIAL											
B1 up to 25 kW (at 400/230		14 50		14 50		14 50		14 50		14 50	
Volts)		14.50		14.50		14.50		14.50		14.50	
B1 - TOU (Peak)		18.00		18.00		18.00		18.00		18.00	
B1 - TOU (Off-Peak)		12.50		12.50		12.50		12.50		12.50	
B2 25-500 kW (at 400 Volts)	400	14.00	400	14.00	400	14.00	400	14.00	400	14.00	
B2 - TOU (Peak)		18.00		18.00		18.00		18.00		18.00	
B2 - TOU (Off-Peak)	400	12.30	400	12.30	400	12.30	400	12.29	400	12.29	
B3 - TOU (Peak) (up to 5000 kW at 11 kV, 33 kV)		18.00		18.00		18.00		18.00		18.00	
B3 - TOU (Off-Peak)	380	12.20	380	12.20	380	12.20	380	12.20	380	12.20	
B4 - TOU (Peak) (at 66 kV, 132 kV		18.00		18.00		18.00		18.00		18.00	
and above)		10.00		10.00		10.00		10.00		10.00	
B4 - TOU (Off-Peak)	360	12.10	360	12.10	360	12.10	360	12.10	360	12.10	
BULK SUPPLY											
C1 (a) Supply at 400 Volts - less than 5 kW		15.00		15.00		15.00		15.00		15.00	
C1 (b) Supply at 400 Volts - 5 kW and above	400	14.50	400	14.50	400	14.50	400	14.50	400	14.50	
Time of Use (TOU) - Peak	1949	18.00		18.00		18.00		18.00		18.00	
Time of Use (TOU) - Off-Peak	400	12.50	400	12.50	400	12.50	400	12.50	400	12.50	
C2 Supply at 11 kV	380	14.30	380	14.30	380	14.30	380	14.30	380	14.30	
Time of Use (TOU) - Peak	251/2	18.00		18.00		18.00	E.	18.00		18.00	
Time of Use (TOU) - Off-Peak	380	12.30	380	12.30	380	12.30	380	12.30	380	12.30	

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PARTICULARS	with effect from 05-08-2013 (except PESCO)		with eff 11-10	with effect from 11-10-2013		with effect from 01-10-2014*		with effect from 10-06-2015**		with effect from 21-03-2018	
	Fixed	Variable ****	Fixed	Variable ****	Fixed	Variable ****	Fixed	Variable ****	Fixed	Variable ****	
C3 Supply above 11 kV	360	14.20	360	14.20	360	14.20	360	14.20	360	14.20	
Time of Use (TOU) - Peak		18.00		18.00		18.00		18.00		18.00	
Time of Use (TOU) - Off-Peak	360	12.20	360	12.20	360	12.20	360	12.20	360	12.20	
AGRICULTURAL											
SCARP		10.00		13.01		13.01		12.00		12.00	
SCARP 5 kW and above											
Time of Use (TOU) - Peak				17.00		17.00		15.00		15.00	
Time of Use (TOU) - Off-Peak			200	10.00	200	10.00	200	8.85	200	8.85	
Agricultural Tube-wells	200	6.77	200	10.35	200	11.51	200	11.50	200	11.50	
Agricultural 5 kW and above											
Time of Use (TOU) - Peak		13.00		10.35		10.35		10.35		10.35	
Time of Use (TOU) - Off-Peak	200	8.00	200	10.35	200	10.35	200	8.85	200	8.85	
PUBLIC LIGHTING		13.73		15.00		15.00		15.00		15.00	
RESIDENTIAL COLONIES ATT. TO INDUSTRIES		12.92		15.00		15.00		15.00		15.00	
RAILWAY TRACTION		11.00		15.00		15.00		15.00		15.00	
Special Contracts - AJ&K	360	12.22	360	12.22	360	12.22	360	12.22	360	12.22	
Time of Use (TOU) - Peak		18.00		18.00		18.00		18.00		18.00	
Time of Use (TOU) - Off-Peak	360	12.20	360	12.20	360	12.20	360	12.20	360	12.20	
Special Contracts - Rawat Lab.		11.50		15.00		15.00		15.00		15.00	

GOP Tariff with effect from 01-10-2014 also includes an amount of surcharge to be deposited in UOF. *

** GOP Tariff with effect from 10-06-2015 also includes an amount of Tariff Rationalization Surcharge. *** Fixed Charges (Rs./kW/Month) **** Variable Charges (Rs./kWh)

 $\Lambda$ 

Month	PESCO	TESCO	IESCO	GEPCO	LESCO	FESCO	MEPCO	HESCO	SEPCO	QESCO
Month				Increase/	(Decrease)	Rs./kWh				
July, 2017	(1.7094)	(1.7094)	(1.7094)	(1.7094)	(1.7094)	(1.7094)	(1.7094)	(1.7094)	(1.7094)	(1.7094)
August, 2017	(1.8198)	(1.8198)	(1.8198)	(1.8198)	(1.8198)	(1.8198)	(1.8198)	(1.8198)	(1.8198)	(1.8198)
September, 2017	(2.1941)	(2.1941)	(2.1941)	(2.1941)	(2.1941)	(2.1941)	(2.1941)	(2.1941)	(2.1941)	(2.1941)
October, 2017	(2.2548)	(2.2548)	(2.2548)	(2.2548)	(2.2548)	(2.2548)	(2.2548)	(2.2548)	(2.2548)	(2.2548)
November, 2017	(3.1143)	(3.1143)	(3.1143)	(3.1143)	(3.1143)	(3.1143)	(3.1143)	(3.1143)	(3.1143)	(3.1143)
December, 2017	(2.9844)	(2.9844)	(2.9844)	(2.9844)	(2.9844)	(2.9844)	(2.9844)	(2.9844)	(2.9844)	(2.9844)
January, 2018	(3.2421)	(3.2421)	(3.2421)	(3.2421)	(3.2421)	(3.2421)	(3.2421)	(3.2421)	(3.2421)	(3.2421)
February, 2018	(2.2866)	(2.2866)	(2.2866)	(2.2866)	(2.2866)	(2.2866)	(2.2866)	(2.2866)	(2.2866)	(2.2866)
March, 2018	(1.8851)	(1.8851)	(1.8851)	(1.8851)	(1.8851)	(1.8851)	(1.8851)	(1.8851)	(1.8851)	(1.8851)
April, 2018	(0.6898)	(0.6898)	(0.6898)	(0.6898)	(0.6898)	(0.6898)	(0.6898)	(0.6898)	(0.6898)	(0.6898)
May, 2018	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212	1.2212
June, 2018	0.5084	0.5084	0.5084	0.5084	0.5084	0.5084	0.5084	0.5084	0.5084	0.5084

**TABLE 72** NEPRA's Monthly Fuel Price Adjustments in respect of DISCOs

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COMPARATIVE TAR	FF STATE	MENT O	PESHA	PESHAWAR ELECTRIC SUPPLY COMPANY LIMITED (PESCO)						
	201	2-13	201	3-14	201	4-15	201	5-16	2015-	16***
PARTICULARS	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable
	Tixea	**	Tikea	**	1 Kea	**	Tuca	**	Tikea	**
RESIDENTIAL	1									
Up to 50 Units		4.00		4.00		4.00		4.00		4.00
For Peak Load requirement less tha	n 5 kW									
01-100 Units		15.00		13.00		12.50		9.15		13.82
101-200 Units				16.24		16.50		13.15		17.31
201-300 Units		16.50		16.24		16.50		13.20		17.41
301-700 Units		18.50		17.90		17.90		14.55		18.76
Above 700 Units		20.50		19.00		19.00		15.65		19.86
For Peak Load requirement exceedi	ng 5 kW				1		1			
Time of Use (TOU) - Peak		20.50		19.00		19.00		15.65		19.82
Time of Use (TOU) - Off-Peak		15.50		13.30		13.30		10.05		14.27
Temporary Supply								15.65		19.82
COMMERCIAL - A2										
For Peak Load requirement less		20.50		19.00		19.00		15.65		19.82
than 5 kW		20.50		15.00		15.00		15.05		15.02
For Peak Load requirement exceedi	ng 5 kW									
Regular	400.00	19.00	400.00	16.00	400.00	15.00	400.00	11.10	400.00	15.27
Time of Use (TOU) - Peak		20.50		19.00		19.00		15.65		19.82
Time of Use (TOU) - Off-Peak	400.00	15.50	400.00	13.30	400.00	13.30	400.00	10.05	400.00	14.27
Temporary Supply								15.65		19.82
GENERAL SERVICES - A3								12.45		15.77
INDUSTRIAL										
B1		17.00		15.50		14.50		11.15		15.32
B1 (Peak)		20.50		19.00		19.00		15.65		19.82
B1 (Off-Peak)		15.50		13.30		13.30		10.05		14.27
B2	400.00	16.50	400.00	15.00	400.00	14.00	400.00	10.65	400.00	14.82
B2 - TOU (Peak)		20.50		19.00		19.00		15.65		19.82
B2 - TOU (Off-Peak)	400.00	15.30	400.00	13 10	400.00	13 10	400.00	985	400.00	14 07
B3 - TOU (Peak)		20.50		19.00		19.00		15.65		19.82
B3 - TOU (Off-Peak)	380.00	15.20	380.00	13.00	380.00	13.00	380.00	9.75	380.00	13.97
B4 - TOU (Peak)	500.00	20.50	500.00	19.00	500.00	19.00	500.00	15.65	500.00	19.82
B4 - TOU (Off-Peak)	360.00	15 10	360.00	12.00	360.00	12.00	360.00	9.65	360.00	13.82
Temporary Supply	500.00	15.10	500.00	12.50	500.00	12.50	500.00	11 15	500.00	15.07
								11.15		10.52
C1 (a) Supply at 400/230 Volts -										1
less than 5 kW		17.50		16.00		15.00		11.65		15.82
C1 (b) Supply at 400/230 Volts - 5										
kW and upto 500 kW	400.00	16.50	400.00	15.50	400.00	14.50	400.00	11.15	400.00	15.32
Time of Use (TOU) - Peak		20 50		19 00		19.00		15 65		19.82
Time of Use (TOU) - Off-Peak	400.00	15 50	400.00	13 30	400.00	13.30	400.00	10.05	400.00	14.27
C2 Supply at 11 33 kV upto and		. 5.5 0		.0.00		.0.00				
including 5000 kW	380.00	16.30	380.00	15.30	380.00	14.30	380.00	10.95	380.00	15.12
Time of Use (TOU) - Peak		20.50		19.00		19.00		15.65		19.82
Time of Use (TOU) - Off-Peak	380.00	15.40	380.00	13.10	380.00	13.10	380.00	9.85	380.00	14.07
C3 Supply at 66 kV and above										
and sanctioned load above 5000	360.00	16.20	360.00	15 20	360.00	14 20	360.00	10.85	360.00	15 02
kW	500.00		500.00		500.00	0	000100		500.00	
Time of Use (TOU) - Peak		20.50		19.00		19.00		15.65		19.82
Time of Use (TOU) - Off-Peak	360.00	15.30	360.00	13.00	360.00	13.00	360.00	975	360.00	13.02
AGRICULTURAL - TARIFF-D	000100		000.00	.0.00	000.00	10100	000.00	5.15	000.00	10.01
SCARP		17 00		15 50		14 50		11 15		15 32
Time of Use (TOU) - Peak		17.00		19.00		19.00		15.65		19.82
Time of Use (TOU) - Off-Peak			200.00	13.00	200.00	13.00	200.00	10.05	200.00	14.27
Agricultural Tube-wells	200.00	16.50	200.00	15.00	200.00	14.00	200.00	10.65	200.00	14.82
Time of Use (TOLI) - Peak	200.00	20.50	200.00	19.00	200.00	19.00	200.00	15.65	200.00	19.82
Time of Use $(TOU) = Off_Paak$	200.00	15.30	200.00	13.00	200.00	13.00	200.00	10.05	200.00	1/ 27
Time Of Use (100) - Oll-reak	200.00	15.50	200.00	13.00	200.00	13.00	200.00	10.05	200.00	14.27

TABLE 73

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	2012	2-13	201	3-14	201	4-15	201	5-16	2015-16***	
PARTICULARS	Fixed *	Variable **	Fixed *	Variable **						
PUBLIC LIGHTING - TARIFF-G		15.85		15.00		14.00		10.65		14.82
RESIDENTIAL COLONIES ATT. TO INDUSTRIES		15.00		15.00		14.00		10.65		14.82
SPECIAL CONTRACT - AJ&K - TARIFF-K	360.00	16.16	360.00	14.38	360.00	14.00	360.00	10.65	360.00	14.82
Time of Use (TOU) - Peak		20.50		19.00		19.00		15.65		19.82
Time of Use (TOU) - Off-Peak	360.00	15.30	360.00	13.00	360.00	13.30	360.00	10.05	360.00	14.27
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above							360.00	10.85	360.00	15.02
Time of Use (TOU) - Peak								15.65		19.82
Time of Use (TOU) - Off-Peak							360.00	9.75	360.00	13.97
J-2 (a) For Supply at 11, 33 kV							380.00	10.95	380.00	15.12
Time of Use (TOU) - Peak								15.65		19.82
Time of Use (TOU) - Off-Peak							380.00	9.85	380.00	14.07
J-2 (b) For Supply at 66 kV and above	ve						360.00	10.85	360.00	15.02
Time of Use (TOU) - Peak								15.65		19.82
Time of Use (TOU) - Off-Peak							360.00	9.75	360.00	13.97
J-3 (a) For Supply at 11, 33 kV							380.00	10.95	380.00	15.12
Time of Use (TOU) - Peak								15.65		19.82
Time of Use (TOU) - Off-Peak							380.00	9.85	380.00	14.07
J-3 (b) For Supply at 66 kV and above	ve						360.00	10.85	360.00	15.02
Time of Use (TOU) - Peak								15.65		19.82
Time of Use (TOU) - Off-Peak							360.00	9.75	360.00	13.97

* Fixed Charges (Rs./kW/Month) ** Variable Charges (Rs./kWh) *** NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17. Source: National Electric Power Regulatory Authority, Islamabad

TABLE 74

#### COMPARATIVE TARIFF STATEMENT OF TRIBAL AREA ELECTRIC SUPPLY COMPANY LIMITED (TESCO)

	201	3-14	2014	4-15	201	5-16	2015-	16***
PARTICULARS	Fixed*	Variable**	Fixed*	Variable**	Fixed*	Variable**	Fixed*	Variable**
RESIDENTIAL								
Up to 50 Units		4.00		4.00		4.00		4.00
For Peak Load requirement less than	n 5 kW							
01-100 Units		12.70		14.30		10.90		11.93
101-200 Units		14.50		17.30		13.20		14.23
201-300 Units		14.50		17.30		14.15		15.23
301-700 Units		16.50		18.00		14.60		15.62
Above 700 Units		17.50		19.00		15.40		16.43
For Peak Load requirement exceedir	ng 5 kW							
Time of Use (TOU) - Peak		17.50		19.00		15.40		16.43
Time of Use (TOU) - Off-Peak		11.50		14.50		10.90		11.93
Temporary Supply						15.40		16.43
COMMERCIAL - A2								
For Peak Load requirement less		17 50		10.00		15 40		16 / 2
than 5 kW		17.50		19.00		13.40		10.43
For Peak Load requirement exceedir	ng 5 kW							
Regular	400.00	15.00	400.00	17.00	400.00	13.40	400.00	14.43
Time of Use (TOU) - Peak		17.50		19.00		15.40		16.43
Time of Use (TOU) - Off-Peak	400.00	11.50	400.00	14.50	400.00	10.90	400.00	11.93
Temporary Supply						15.40		16.43
<b>GENERAL SERVICES - A3</b>						14.70		16.23
INDUSTRIAL					The second			
B1		14.50		15.00	Stree lands	11.40	- Sandara -	12.43
B1 (Peak)		17.50	L.	19.00		15.40		16.43
B1 (Off-Peak)		11.50		14.50		10.90		11.93
B2	400.00	14.00	400.00	14.50	400.00	10.90	400.00	11.93
B2 - TOU (Peak)		17.50		19.00		15.40		16.43
B2 - TOU (Off-Peak)	400.00	11.30	400.00	14.30	400.00	10.70	400.00	11.73

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	201	3-14	201	4-15	201	5-16	2015-1	
PARTICULARS	Fixed*	Variable**	Fixed*	Variable**	Fixed*	Variable**	Fixed*	Variable**
B3 - TOU (Peak)		17.50		19.00		15.40		16.43
B3 - TOU (Off-Peak)	380.00	11.20	380.00	14.20	380.00	10.60	380.00	11.63
B4 - TOU (Peak)		17.50		19.00		15.40		16.43
B4 - TOU (Off-Peak)	360.00	11.10	360.00	14.10	360.00	10.50	360.00	11.53
Temporary Supply						11.40		12.43
BULK SUPPLY								
C1 (a) Supply at 400/230 Volts -		15.00		15 50		11 90		12 93
less than 5 kW		15.00		15.50		11.50		12.55
C1 (b) Supply at 400/230 Volts - 5 kW and unto 500 kW	400.00	14.50	400.00	15.00	400.00	11.40	400.00	12.43
Time of Use (TOU) - Peak		17 50		19.00		15.40		16.43
Time of Use (TOU) - Off-Peak	400.00	11.50	400.00	14.50	400.00	10.40	400.00	11.43
C2 Supply at 11, 22 kV upto and	400.00	11.50	400.00	14.50	400.00	10.90	400.00	11.95
including 5000 kW	380.00	14.30	380.00	14.80	380.00	11.20	380.00	12.23
Time of Use (TOU) - Peak		17.50		19.00		15.40		16.43
Time of Use (TOU) - Off-Peak	380.00	11.30	380.00	14.30	380.00	10.70	380.00	11.73
C3 Supply at 66 kV and above and sanctioned load above 5000	360.00	14.20	360.00	14.70	360.00	11.10	360.00	12.13
Time of Use (TOU) - Peak		17 50		19.00		15.40		16.43
Time of Use (TOU) Off Book	260.00	11.30	260.00	14.20	260.00	10.40	260.00	11.62
	500.00	11.20	500.00	14.20	500.00	10.00	500.00	11.05
SCADD		12.50		15.00		11.40		12 / 2
Time of Use (TOU) - Peak		17.50		19.00		11.40		16.43
Time of Use (TOU) - Off-Peak	200.00	11.30	200.00	14.20	200.00	10.40	200.00	11.43
Agricultural Tube-wells	200.00	12.07	200.00	14.20	200.00	10.00	200.00	11.03
Time of Use (TOU) Beak	200.00	12.57	200.00	14.30	200.00	15.40	200.00	16.42
Time of Use (TOU) - Peak	200.00	17.50	200.00	14.20	200.00	10.40	200.00	11.45
	200.00	11.20	200.00	14.20	200.00	11.00	200.00	11.03
		15.00		15.00		11.40		12.45
TO INDUSTRIES		15.00		15.00		11.40		12.43
SPECIAL CONTRACT - TARIFF-J								
J-1 For Supply at 66 kV and above					360.00	11.10	360.00	12.13
Time of Use (TOU) - Peak						15.40		16.43
Time of Use (TOU) - Off-Peak					360.00	10.60	360.00	11.63
J-2 (a) For Supply at 11, 33 kV					380.00	11.20	380.00	12.23
Time of Use (TOU) - Peak						15.40		16.43
Time of Use (TOU) - Off-Peak					380.00	10.70	380.00	11.73
J-2 (b) For Supply at 66 kV and above	е				360.00	11.10	360.00	12.13
Time of Use (TOU) - Peak						15.40		16.43
Time of Use (TOU) - Off-Peak					360.00	10.60	360.00	11.63
J-3 (a) For Supply at 11, 33 kV					380.00	11.20	380.00	12.23
Time of Use (TOU) - Peak						15.40		16.43
Time of Use (TOU) - Off-Peak					380.00	10.70	380.00	11.73
J-3 (b) For Supply at 66 kV and above	е				360.00	11.10	360.00	12.13
Time of Use (TOU) - Peak						15.40		16.43
Time of Use (TOU) - Off-Peak					360.00	10.60	360.00	11.63

* Fixed Charges (Rs./kW/Month) ** Variable Charges (Rs./kWh) *** NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17. Source: National Electric Power Regulatory Authority, Islamabad

 $\parallel$  IVIV

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PARTLCULARS         2013-14 Face /r         2013-14 Face /r         2013-14 Face /r         2013-14 Face /r         2013-16 Face /	COMPARATIVE TAR	IFF STATE	EMENT O	F ISLAMA	BAD ELE	CTRIC SU	PPLY CO	MPANY L	IMITED (	IESCO)	
PARTUCULARS         Fixed **         Variable ref         Fixed **         Variable ref         Fixed **         Variable ref           RESIDENTIAL Up to 50 Units         1.00         11.00         10.20         9.00         7.75         9.31           101-20 Units         11.00         11.250         11.100         11.250         11.00         11.250         14.230           201-300 Units         15.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Preak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Preak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Preak         18.00         17.50         15.00         14.25         15.63           Time of Use (TOU) - Preak         18.00         17.50         15.00         11.25         400.00         12.64           COMMERCIN2         11.00         15.00         11.25         400.00         12.65         400.00         12.64         400.00         12.64         400.00		201	2-13	201	3-14	2014	4-15	2015	5-16*	2015	j-16 [*]
RESIDENTIAL Up to 50 Units         Local         Local <thlocal< th="">         Lo</thlocal<>	PARTICULARS	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable
RESIDENTIAL         Up to 50 Units         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         1.00         1.1.00         1.1.00         1.1.00         1.1.00         1.1.00         1.1.00         1.1.00         1.1.00         1.1.00         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100         1.1.100		Tixea	***	Tixea	***	Tixeu	***	Tixea	***	Tixea	***
Up to 50 Units         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         4.00         1.00         1.20         1.00         1.250         1.100         1.250         1.121         1.121         1.120         1.100         1.250         1.123         1.123         1.123         1.123         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.120         1.125         1.120         1.125         1.120         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125         1.125 <th1.125< th=""> <th1.125< th=""> <th1.125< th=""> <t< td=""><td>RESIDENTIAL</td><td>r</td><td></td><td></td><td></td><td>r</td><td></td><td>r</td><td></td><td></td><td></td></t<></th1.125<></th1.125<></th1.125<>	RESIDENTIAL	r				r		r			
For Peak Load requirement less         III.00         III.25         III.00         III.25         III.00         III.25         III.23         III.00         III.25         III.23         III.23 <thiii.23< th="">         III.23         <thiii.23< t<="" td=""><td>Up to 50 Units</td><td></td><td>4.00</td><td></td><td>4.00</td><td></td><td>4.00</td><td></td><td>4.00</td><td></td><td>4.00</td></thiii.23<></thiii.23<>	Up to 50 Units		4.00		4.00		4.00		4.00		4.00
01-100 Units         11.00         10.50         9.00         7.75         9.31           101-200 Units         12.50         11.00         12.50         11.20           201-300 Units         15.00         12.50         13.80         13.80           301-700 Units         17.00         15.00         13.00         13.80         15.51           FOr Pack Load requirement exceeding 5 KW         11.00         15.15         15.15         15.15           Time of Use (TOU) - Off-Pack         12.50         11.50         9.25         7.75         9.30           Temeor Use (TOU) - Off-Pack         12.50         15.00         14.25         15.68           COMMERCIAL - A2	For Peak Load requirement less that	n 5 kW									
101-200 Units         12.50         11.00         12.70         12.50         14.23           301-300 Units         17.00         15.00         15.00         15.00         15.00         15.00           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         17.27           Teme of Use (TOU) - Oth-Peak         12.50         11.50         9.25         7.75         9.30           COMMERCIAL - A2         Temporary Supply         10         15.00         15.15         16.63           For Peak Load requirement exceeding 5 kW         18.00         17.50         15.00         15.15         16.63           For Peak Load requirement exceeding 5 kW         18.00         17.50         400.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         16.00         17.50         400.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         16.00         17.50         400.00         17.51         16.63           Teme of Use (TOU) - Off-Peak         400.00         14.50         12.00         11.25         400.00         12.61           If the of Use (TOU) - Off-Peak         400.00         14.50         12.00         11.25         1	01-100 Units		11.00		10.50		9.00		7.75		9.31
201-300 Units         15.00         12.50         14.23           301-700 Units         17.00         15.00         13.00         13.80         15.54           Above 700 Units         17.00         15.00         15.00         15.15         17.27           For Peak Load requirement exceeding 5 KW         115.00         9.25         7.75         9.30           Teme of Use (TOU) - OR-Peak         12.50         11.50         9.25         7.75         9.30           Temeor Use (TOU) - OR-Peak         12.50         15.00         14.25         15.68           COMMERCIAL - A2	101-200 Units				12.50		11.00		11.00		12.71
301-700 Units         17.00         15.00         13.00         13.80         15.54           Above 700 Units         18.00         17.50         15.00         15.15         17.27           For Pask Load requirement exceeding 5 KW         18.00         17.50         9.25         7.75         9.30           COMMERCIAL - A2         For Pask Load requirement less in the requirement exceeding 5 KW         15.00         15.15         15.66           For Pask Load requirement exceeding 5 KW         18.00         17.50         15.00         15.15         15.66           For Pask Load requirement exceeding 5 KW         18.00         17.50         15.00         15.12         40.00         16.68           Time of Use (TOU) - Off-Peak         400.00         12.00         400.00         17.50         15.00         15.15         16.68           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         17.50         15.00         15.15         16.68           Roter Quirement exceeding 2 KW         14.25         12.00         11.25         12.01         14.25           Bit Bit II 4.50         14.50         12.00         11.25         12.73         15.00         15.15         16.63           Bit COU / Off-Peak         400.0	201-300 Units		15.00		12.50		11.00		12.50		14.23
Above 700 Units         15.00         17.50         15.00         15.15         17.27           Time of Use (TCU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TCU) - OF-Peak         12.50         11.50         9.25         7.75         9.30           Temporary Supply         Image of Use (TCU) - OF-Peak         12.50         11.50         9.25         17.75         9.30           For Peak Load requirement exceeding 5 kW         For Peak Load requirement exceeding 5 kW         16.00         17.50         15.00         11.425         15.68           For Peak Load requirement exceeding 5 kW         For Peak Load requirement exceeding 5 kW         16.00         17.50         10.00         11.25         12.68           Time of Use (TCU) - Peak         18.00         17.50         400.00         12.00         400.00         13.51         16.63           Time of Use (TCU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TCU) - Peak         14.50         14.50         12.00         11.25         12.75           B1         14.50         14.50         12.00         11.25         12.75         15.60           B1 (OFI-Peak)         18.00 </td <td>301-700 Units</td> <td></td> <td>17.00</td> <td></td> <td>15.00</td> <td></td> <td>13.00</td> <td></td> <td>13.80</td> <td></td> <td>15.54</td>	301-700 Units		17.00		15.00		13.00		13.80		15.54
For Peak Load requirement exceeding 5 kW         Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Peak         12.50         11.50         9.25         7.75         9.30           Commercing Supply         1         1         15.00         15.15         16.93           Commercing Supply         1         1         15.00         11.25         15.68           For Peak Load requirement exceeding 5 kW         Regular         400.00         15.00         400.00         15.00         15.15         16.63           Time of Use (TOU) - Peak         400.00         12.50         400.00         15.00         15.00         15.15         16.63           Regular         400.00         12.50         400.00         15.00         12.50         12.60         13.55         15.68           Time of Use (TOU) - Off-Peak         10.00         12.50         400.00         14.25         15.68         14.50         12.00         11.25         400.00         14.25         15.58         15.56         15.58         15.55         15.63         15.5         15.63         15.75         15.00         12.25         17.75         400.00         12.70         12.70 <t< td=""><td>Above 700 Units</td><td></td><td>18.00</td><td></td><td>17.50</td><td></td><td>15.00</td><td></td><td>15.15</td><td></td><td>17.27</td></t<>	Above 700 Units		18.00		17.50		15.00		15.15		17.27
Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         12.50         11.50         9.25         7.75         9.30           Temporary Supply         1         15.00         15.15         16.93           For Peak Load requirement less than 5 kW         18.00         17.50         15.00         11.25         400.00         12.66           Time of Use (TOU) - Peak         400.00         16.00         17.50         15.00         11.25         400.00         12.68           Time of Use (TOU) - Peak         400.00         12.50         400.00         12.50         400.00         7.75         400.00         13.50         400.00         12.50         400.00         12.50         11.50         12.60         11.25         12.76           Remporary Supply         1         14.50         14.50         14.50         14.25         15.56         15.50         15.50         15.50         15.50         15.50         15.50         15.50         15.50         15.50         15.50         15.55         16.63         12.01         12.25         12.73         14.35         12.60         11.25         12.70         15.50         15.55         15.5	For Peak Load requirement exceedi	ng 5 kW					-	-			
Time of Use (TOU) - Off-Peak         12.50         11.50         9.25         7.75         9.30           COMMERCIAL - A2         1         15.00         15.15         16.33         15.03         15.03         15.03         15.03         15.03         15.03         15.03         15.03         15.05         15.05         15.06         15.05         15.06         15.05         15.00         12.26         400.00         12.26         400.00         12.26         400.00         12.50         400.00         15.00         40.00         13.50         400.00         12.50         15.00         15.15         16.63         16.63         17.50         15.00         14.25         10.00         13.56         16.63         17.50         15.00         14.25         15.58         15.68         15.68         14.25         15.68         14.25         15.58         16.63         11.55         16.63         11.55         16.63         11.55         16.63         12.10         11.25         14.23         15.68         16.64         14.50         14.25         15.05         15.63         16.63         12.10         12.12         12.10         12.12         12.10         12.12         12.16         12.13         12.10         12.23	Time of Use (TOU) - Peak		18.00		17.50		15.00		15.15		16.63
Temporary Supply         15.15         16.93           COMMERCIA - A2         For Peak Load requirement less         18.00         17.50         15.00         14.25         15.68           For Peak Load requirement exceeding 5 kW         Regular         400.00         16.00         400.00         15.00         400.00         12.06         400.00         12.56         400.00         12.68           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Temporary Supply         0         1         0         0.00         9.25         400.00         7.75         400.00         13.35           Temporary Supply         0         1         14.50         14.50         12.00         11.25         12.73           B1 (Peak)         18.00         17.50         15.00         15.15         16.63           B2 - CDU (Off-Peak)         400.00         14.00         400.00         11.55         400.00         12.23           B2 - TOU (Off-Peak)         18.00         17.50         15.00         15.15         16.63           B2 - TOU (Off-Peak)         380.00         12.00         11.55         10.00         7.55         400.00         12.23           <	Time of Use (TOU) - Off-Peak		12.50		11.50		9.25		7.75		9.30
COMMERCIAL - A2         Tor Peak Load requirement less         18.00         17.50         15.00         14.25         15.68           For Peak Load requirement exceeding 5 kW         Regular         400.00         16.00         400.00         15.00         400.00         11.25         400.00         12.68           Time of Use (TOU) - Peak         400.00         12.50         400.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         12.50         400.00         13.50         12.00         14.25         15.68           GENERAL SERVICES - A3            12.00         11.25         12.73         15.00         15.15         16.63           B1 (Peak)         18.00         17.50         15.00         15.15         16.63         12.73         16.63         12.73         16.63         12.73         16.63         12.73         15.00         15.15         16.63         12.73         15.00         15.15         16.63         12.73         15.00         15.15         16.63         12.70         10.75         40.00         12.30         40.00         12.00         15.15         16.63         12.70         15.00<	Temporary Supply								15.15		16.93
For Peak Load requirement less than 5 kW         18.00         17.50         15.00         14.25         15.68           For Peak Load requirement exceeding 5 kW         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	COMMERCIAL - A2										
than 5, kW         10.00         17.30         15.00         14.43         15.00           For Peak Load requirement exceeding 5, KW         400.00         16.00         400.00         15.00         400.00         15.05         400.00         12.60           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         12.50         400.00         9.25         400.00         7.75         400.00         9.33           Temporary Supply         0         12.50         400.00         12.50         12.00         12.73         15.00           GENREAL SERVICES - A3         1         14.50         14.50         12.00         11.25         12.73           B1         14.50         14.50         14.50         15.00         15.15         16.63           B2         400.00         14.00         400.00         11.00         400.00         10.75         400.00           B2 - TOU (Peak)         400.00         12.00         11.50         400.00         15.15         16.63           B3 - TOU (Peak)         400.00         12.00         17.50         15.00         15.15         16.63           B3 - TOU (Peak)         380.00         12.20         380.00         17.50         15.0	For Peak Load requirement less		10.00		17 50		10.00		14.25		15.00
For Peak Load requirement exceeding 5 kW           Regular         400.00         15.00         400.00         12.00         400.00         12.68           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.00         15.00         15.00         93.3           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         92.5         400.00         7.75         400.00         93.3           Temporary supply         14.25         13.58         600.00         7.75         400.00         13.56           GENERAL SERVICES - A3         14.50         14.50         12.00         11.25         12.73           B1         14.50         14.50         12.50         15.00         15.15         16.63           B2 (Off-Peak)         12.50         17.50         15.00         15.15         16.63           B2 - TOU (Off-Peak)         400.00         14.00         400.00         14.00         400.00         15.00         15.15         16.63           B2 - TOU (Off-Peak)         80.00         17.50         15.00         15.15         16.63           B2 - TOU (Off-Peak)         380.00         12.20         400.00         13.30         400.00         7.55	than 5 kW		10.00		17.50		15.00		14.25		15.00
Regular         400.00         16.00         400.00         15.00         400.00         11.25         400.00         12.56           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         11.50         400.00         7.75         400.00         9.33           Temporary Supply         1         1         1         14.25         15.66           GENREAL SERVICES - A3         1         14.25         12.73           B1         14.50         14.50         12.00         11.25         12.73           B1 (Peak)         18.00         17.50         15.00         15.15         16.63           B1 (Off-Peak)         12.50         11.50         9.25         7.75         9.43           B2 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B2 - TOU (Peak)         400.00         12.00         11.20         80.00         15.55         400.00         9.23           B3 - TOU (Peak)         80.00         12.20         15.00         15.15         16.63           B3 - TOU (Peak)         360.00         12.10         360.00         17.50         15.00         15.15         16.63           Temporary Supply	For Peak Load requirement exceeding	ng 5 kW									
Time of Use (TOU) - Peak         18.00         17.50         17.60         15.00         15.15         1663           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         11.50         400.00         7.75         400.00         9.33           Temporary Supply         Image         Image         12.10         Image         15.68           GENERAL SERVICES - A3         Image         Image         12.10         Image         12.10         Image           B1         Image         14.50         Image         12.10         Image         12.10         Image           B1 (Peak)         Image         14.50         Image         12.50         Image         15.00         15.51         Image           B2 - TOU (Peak)         Image         14.00         400.00         14.00         400.00         15.00         Image         15.00         Image         12.23           B2 - TOU (Peak)         Image         Ima	Regular	400.00	16.00	400.00	15.00	400.00	12.00	400.00	11.25	400.00	12.68
Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         11.50         400.00         9.25         400.00         7.75         400.00         9.33           Temporary Supply         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I         I	Time of Use (TOU) - Peak		18.00		17.50		15.00		15.15		16.63
Temporary Supply         Important Supply <thimportant supply<="" th=""> <thimportant supply<="" t<="" td=""><td>Time of Use (TOU) - Off-Peak</td><td>400.00</td><td>12.50</td><td>400.00</td><td>11.50</td><td>400.00</td><td>9.25</td><td>400.00</td><td>7.75</td><td>400.00</td><td>9.33</td></thimportant></thimportant>	Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	11.50	400.00	9.25	400.00	7.75	400.00	9.33
GENERAL SERVICES - A3         Image: Constraint of the service o	Temporary Supply								14.25		15.68
INDUSTRIAL         Image: constraint of the second sec	GENERAL SERVICES - A3								12.10		14.58
B1         14,50         14,50         12,00         11,25         12,73           B1 (Peak)         18,00         17,50         15,00         15,15         16,63           B1 (Off-Peak)         12,50         11,50         9,25         7,75         9,43           B2         400,00         14,00         400,00         11,50         400,00         10,75         400,00         12,23           B2 - TOU (Peak)         18,00         17,50         15,00         15,15         400,00         9,23           B3 - TOU (Peak)         18,00         17,50         15,00         15,15         400,00         9,23           B4 - TOU (Peak)         18,00         17,50         15,00         15,15         16,63           B4 - TOU (Peak)         360,00         12,10         360,00         11,10         360,00         7,25         360,00         8,83           Temporary Supply         15,00         11,20         380,00         7,25         360,00         12,10         360,00         12,10         360,00         12,10         360,00         12,10         11,25         12,73         11,25         12,73         11,25         12,73         12,23         11,175         13,23         12,20	INDUSTRIAL										
B1 (Peak)         18.00         17.50         15.00         15.15         16.63           B1 (Off-Peak)         12.50         11.50         9.25         7.75         9.43           B2         400.00         14.00         400.00         11.50         400.00         10.75         400.00         12.23           B2 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B2 - TOU (Peak)         400.00         12.20         380.00         17.50         15.00         15.15         16.63           B3 - TOU (Peak)         380.00         12.20         380.00         17.50         15.00         15.15         16.63           B4 - TOU (Peak)         380.00         12.10         380.00         17.50         15.00         15.15         16.63           Butk SUPP W         12.00         380.00         17.50         15.00         15.15         16.63           C1 (a) Supply at 400/230 Volts - 5         400.00         14.50         400.00         12.50         11.75         13.23           C1 (b) Supply at 400/230 Volts - 5         400.00         14.50         400.00         12.50         11.55         16.63           Time of Use (TOU) - Off-Peak         400.00	B1		14.50		14.50		12.00		11.25		12.73
B1 (Off-Peak)         12.50         11.50         9.25         7.75         9.43           B2         400.00         14.00         400.00         11.50         400.00         10.75         400.00         12.23           B2 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B2 - TOU (Off-Peak)         400.00         12.30         400.00         9.05         400.00         7.55         400.00         9.23           B3 - TOU (Off-Peak)         380.00         12.20         380.00         12.20         380.00         15.15         16.63           B4 - TOU (Peak)         360.00         12.10         360.00         17.50         15.00         15.15         16.63           B4 - TOU (Off-Peak)         360.00         12.10         360.00         11.10         360.00         8.75         360.00         7.25         360.00         8.83           BUK SUPPLY          15.00         15.00         12.50         11.75         13.23           C1 (a) Supply at 400/230 Volts - 5         400.00         14.50         400.00         12.50         11.75         13.23           C2 Supply at 10.33 kV upto and including 500 kW         18.00         17.50         1	B1 (Peak)		18.00		17.50		15.00		15.15		16.63
B2         400.00         14.00         400.00         14.00         400.00         11.50         400.00         10.75         400.00         12.23           B2 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B2 - TOU (Peak)         380.00         12.23         400.00         17.50         15.00         15.15         400.00         9.23           B3 - TOU (Peak)         380.00         12.20         380.00         11.20         380.00         7.55         400.00         9.23           B4 - TOU (Peak)         380.00         12.20         380.00         11.20         380.00         15.15         16.63           B4 - TOU (Peak)         360.00         12.10         360.00         11.10         360.00         7.25         360.00         8.83           Temporary Supply         12.00         360.00         14.50         400.00         14.50         400.00         12.50         11.75         13.23           C1 (b) Supply at 400/230 Volts - Less than 5 kW         15.00         15.00         15.00         15.15         16.63           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (T	B1 (Off-Peak)		12.50		11.50		9.25		7.75		9.43
B2 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B2 - TOU (Off-Peak)         400.00         12.30         400.00         9.05         400.00         7.55         400.00         9.23           B3 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B3 - TOU (Peak)         380.00         12.20         380.00         17.50         15.00         15.15         16.63           B4 - TOU (Peak)         360.00         12.10         360.00         11.20         380.00         7.35         380.00         9.03           B4 - TOU (Off-Peak)         360.00         11.10         360.00         8.75         360.00         7.25         360.00         8.83           Temporary Supply          15.00         12.50         11.75         13.23         12.73           BUK SUPLY          15.00         14.50         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         12.50         4	B2	400.00	14.00	400.00	14.00	400.00	11.50	400.00	10.75	400.00	12.23
B2 - TOU (Off-Peak)         400.00         12.30         400.00         11.30         400.00         9.05         400.00         7.55         400.00         9.23           B3 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B3 - TOU (Peak)         380.00         12.20         380.00         17.50         15.00         15.15         16.63           B4 - TOU (Peak)         360.00         12.10         360.00         11.10         360.00         7.25         360.00         8.83           Temporary Supply         1         1         360.00         17.50         15.00         15.15         16.63           BULK SUPPLY         1         1         360.00         14.50         400.00         12.50         11.75         13.23           C1 (b) Supply at 400/230 Volts - 5         400.00         14.50         400.00         12.50         11.75         13.23           C1 (b) Supply at 400/230 Volts - 5         400.00         12.50         15.00         15.15         16.63           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Peak         380.00         14.30         380.00	B2 - TOU (Peak)		18.00		17.50		15.00		15.15		16.63
B3 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B3 - TOU (Off-Peak)         380.00         12.20         380.00         17.50         15.00         15.15         16.63           B4 - TOU (Off-Peak)         360.00         12.10         360.00         17.50         15.00         15.15         16.63           B4 - TOU (Off-Peak)         360.00         12.10         360.00         11.10         360.00         8.75         360.00         7.25         360.00         8.83           Temporary Supply         11.25         12.73         11.25         12.73         11.25         12.73           BUK SUPPLY         11.25         12.50         11.75         13.23         13.23           C1 (a) Supply at 400/230 Volts - 5         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         14.30         380.00         14.30         380.00         11.80         380.00         11.05         380.00         12.53           Time of Use (TOU) - Off-Peak	B2 - TOU (Off-Peak)	400.00	12.30	400.00	11.30	400.00	9.05	400.00	7.55	400.00	9.23
B3 - TOU (Off-Peak)         380.00         12.20         380.00         11.20         380.00         8.85         380.00         7.35         380.00         9.03           B4 - TOU (Off-Peak)         18.00         17.50         15.00         15.15         16.63           B4 - TOU (Off-Peak)         360.00         12.10         360.00         11.10         360.00         7.25         360.00         8.83           ToU (Off-Peak)         360.00         12.10         360.00         11.10         360.00         7.25         360.00         8.83           Temporary Supply          15.00         15.00         12.50         11.75         13.23           C1 (a) Supply at 400/230 Volts - 5         400.00         14.50         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         9.25         400.00         7.75         400.00         12.53           Time of Use (TOU) - Off-Peak         18.00         17.50         15.00         15.15         16.63 <tr< td=""><td>B3 - TOU (Peak)</td><td></td><td>18.00</td><td></td><td>17.50</td><td></td><td>15.00</td><td></td><td>15.15</td><td></td><td>16.63</td></tr<>	B3 - TOU (Peak)		18.00		17.50		15.00		15.15		16.63
B4 - TOU (Peak)         18.00         17.50         15.00         15.15         16.63           B4 - TOU (Off-Peak)         360.00         12.10         360.00         11.10         360.00         7.25         360.00         8.83           Temporary Supply         1         12.00         360.00         11.10         360.00         7.25         360.00         8.83           Temporary Supply         1         12.73         11.25         12.73           Bulk SUPPLY         15.00         15.00         12.50         11.75         13.23           C1 (a) Supply at 400/230 Volts - 5 kW         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Wand upto 500 kW         400.00         14.50         400.00         14.50         400.00         12.00         400.00         12.73           C2 Supply at 11, 33 KV upto and including 5000 kW         380.00         14.30         380.00         11.80         380.00         11.80         380.00         12.53         10.00         12.53           Time of Use (TOU) - Off-Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         380.00         14.	B3 - TOU (Off-Peak)	380.00	12.20	380.00	11.20	380.00	8.85	380.00	7.35	380.00	9.03
B4 - TOU (Off-Peak)         360.00         12.10         360.00         11.10         360.00         8.75         360.00         7.25         360.00         8.83           Temporary Supply         Image: Construction of the second o	B4 - TOU (Peak)		18.00		17 50		15.00		15 15		16.63
Temporary Supply         Decke         Table         Table         Decke         Table         Table         Table         Decke         Table	B4 - TOU (Off-Peak)	360.00	12 10	360.00	11 10	360.00	875	360.00	7.25	360.00	8.83
Bulk SUPPLY         11.00         15.00         12.50         11.75         13.23           C1 (a) Supply at 400/230 Volts - less than 5 kW         400.00         14.50         400.00         14.50         400.00         12.50         11.75         13.23           C1 (b) Supply at 400/230 Volts - less than 5 kW         400.00         14.50         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         9.25         400.00         7.75         400.00         9.30           C2 Supply at 11, 33 kV upto and including 500 kW         380.00         14.30         380.00         14.30         380.00         14.30         380.00         11.80         380.00         12.53           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         380.00         12.30         380.00         11.30         380.00         7.55         380.00         12.43           W         10         14.20         360.00         14.20	Temporary Supply	000.00		000100		000.00	0.1.5	000.00	11.25	000.00	12 73
C1 (a) Supply at 400/230 Volts - less than 5 kW         15.00         15.00         12.50         11.75         13.23           C1 (b) Supply at 400/230 Volts - 5 kW and upto 500 kW         400.00         14.50         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         14.30         380.00         14.30         380.00         15.15         16.63           C2 Supply at 11, 33 kV upto and including 5000 kW         380.00         14.30         380.00         14.30         380.00         11.80         380.00         11.05         380.00         12.53           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         380.00         12.30         380.00         11.30         380.00         11.75         380.00         12.53           Time of Use (TOU) - Off-Peak         360.00         14.20         360.00         14.20         360.00         11.70         360.00         12.43           W         360.00         1	BULK SUPPLY										
Less than 5 kW         15.00         15.00         12.50         11.75         13.23           C1 (b) Supply at 400/230 Volts - 5 kW and up to 500 kW         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           C2 Supply at 11, 33 kV upto and including 5000 kW         380.00         14.30         380.00         14.30         380.00         11.80         380.00         11.55         400.00         9.25           C3 Supply at 11, 33 kV upto and including 5000 kW         380.00         14.30         380.00         11.30         380.00         11.55         16.63           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Peak         380.00         12.30         380.00         11.70         380.00         7.55         380.00         12.43           W         360.00         14.20         360.00         11.70         360.00         10.95         360.00         12.43           W         360.00         14.20         360.00         11.70         360.00         7.35         360.00 <td< td=""><td>C1 (a) Supply at 400/230 Volts -</td><td></td><td>45.00</td><td></td><td>45.00</td><td></td><td>10 50</td><td></td><td></td><td></td><td>10.00</td></td<>	C1 (a) Supply at 400/230 Volts -		45.00		45.00		10 50				10.00
C1 (b) Supply at 400/230 Volts - 5 kW and upto 500 kW       400.00       14.50       400.00       12.00       400.00       11.25       400.00       12.73         Time of Use (TOU) - Peak       18.00       17.50       15.00       15.15       16.63         Time of Use (TOU) - Off-Peak       400.00       12.50       400.00       11.50       400.00       9.25       400.00       7.75       400.00       9.30         C2 Supply at 11, 33 kV upto and including 5000 kW       380.00       14.30       380.00       14.30       380.00       11.80       380.00       11.05       380.00       12.53         Time of Use (TOU) - Peak       18.00       17.50       15.00       15.15       16.63         Time of Use (TOU) - Off-Peak       380.00       12.30       380.00       11.30       380.00       9.05       380.00       7.55       380.00       9.10         C3 Supply at 66 kV and above and sanctioned load above 5000       360.00       14.20       360.00       11.20       360.00       11.70       360.00       10.95       360.00       12.43         KW       1       14.20       360.00       17.50       15.00       15.15       16.63         Time of Use (TOU) - Peak       18.00       17.50       15	less than 5 kW		15.00		15.00		12.50		11.75		13.23
kW and upto 500 kW         400.00         14.50         400.00         14.50         400.00         12.00         400.00         11.25         400.00         12.73           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         400.00         12.50         400.00         11.50         400.00         9.25         400.00         7.75         400.00         9.30           C2 Supply at 11, 33 kV upto and including 5000 kW         380.00         14.30         380.00         14.30         380.00         11.80         380.00         11.05         380.00         12.53           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         380.00         12.30         380.00         11.30         380.00         9.05         380.00         7.55         380.00         9.10           C3 Supply at 66 kV and above and sanctioned load above 5000         360.00         14.20         360.00         11.70         360.00         10.95         360.00         12.43           kW         1         12.00         15.15         16.63         16.63         16.63         16.63         16.63	C1 (b) Supply at 400/230 Volts - 5	400.00	44.50	100.00	44.50	100.00	12.00	100.00	44.05	100.00	40 70
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	kW and upto 500 kW	400.00	14.50	400.00	14.50	400.00	12.00	400.00	11.25	400.00	12.73
Time of Use (TOU) - Off-Peak400.0012.50400.0011.50400.009.25400.007.75400.009.30C2 Supply at 11, 33 kV upto and including 5000 kW380.0014.30380.0014.30380.0011.80380.0011.05380.0011.53Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Off-Peak380.0012.30380.0011.30380.009.05380.007.55380.009.10C3 Supply at 66 kV and above and sanctioned load above 5000360.0014.20360.0014.20360.0011.70360.0010.95360.0012.43WTime of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Off-Peak360.0012.20360.0011.20360.007.35360.008.88AGRICULTURAL - TARIFF-DSCARP14.5014.5012.0012.1513.63Time of Use (TOU) - Peak200.0014.00200.0014.00200.007.35200.008.95Agricultural Tube-wells200.0014.00200.0014.00200.0015.1516.63Time of Use (TOU) - Peak200.0014.00200.0014.00200.0015.1516.63 <tr <tr="">Time of Use (TOU) -</tr>	Time of Use (TOU) - Peak		18.00		17.50		15.00		15.15		16.63
C2 Supply at 11, 33 kV upto and including 5000 kW         380.00         14.30         380.00         14.30         380.00         11.80         380.00         11.05         380.00         12.53           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         380.00         12.30         380.00         11.30         380.00         9.05         380.00         7.55         380.00         9.10           C3 Supply at 66 kV and above and sanctioned load above 5000         360.00         14.20         360.00         14.20         360.00         11.70         360.00         10.95         360.00         12.43           KW         360.00         14.20         360.00         11.20         360.00         11.70         360.00         10.95         360.00         12.43           KW         360.00         14.20         360.00         11.20         360.00         7.35         360.00         12.43           KW         360.00         14.20         360.00         11.20         360.00         8.85         360.00         7.35         360.00         8.88           AGRICULTURAL - TARIFF-D         SCARP         14.50         14.50         12.00	Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	11.50	400.00	9.25	400.00	7.75	400.00	9.30
including 5000 kW14.30380.0014.30380.0014.30380.0011.80380.0011.05380.0012.33Time of Use (TOU) - Off-Peak380.0012.30380.0017.5015.0015.1516.63Time of Use (TOU) - Off-Peak380.0012.30380.0011.30380.009.05380.007.55380.009.10C3 Supply at 66 kV and above and sanctioned load above 5000360.0014.20360.0014.20360.0011.70360.0010.95360.0012.43KW10014.20360.0014.20360.0014.20360.0015.1516.63Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Off-Peak360.0012.20360.0011.20360.008.85360.007.35360.008.88AGRICULTURAL - TARIFF-D14.5014.5014.5012.0015.1516.63SCARP14.5014.5014.5012.0015.1516.63Time of Use (TOU) - Peak200.0011.20200.008.85200.007.35200.008.95Agricultural Tube-wells200.0014.00200.0014.00200.0011.5015.1516.63Time of Use (TOU) - Peak18.0017.5015.0015.1516.6316.63Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Peak18.001	C2 Supply at 11, 33 kV upto and	200.00	11.20	200.00	44.20	200.00	44.00	200.00	11.05	200.00	40.50
Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         380.00         12.30         380.00         11.30         380.00         9.05         380.00         7.55         380.00         9.10           C3 Supply at 66 kV and above and sanctioned load above 5000         360.00         14.20         360.00         14.20         360.00         11.70         360.00         10.95         360.00         12.43           KW         1         14.20         360.00         14.20         360.00         11.70         360.00         10.95         360.00         12.43           KW         1         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           AGRICULTURAL - TARIFF-D         360.00         12.20         360.00         11.20         360.00         7.35         360.00         8.88           AGRICULTURAL - TARIFF-D         14.50         14.50         12.00         12.15         13.63           Time of Use (TOU) - Peak         200.00         11.20         200.00         8.85         200.00         7.35 <td< td=""><td>including 5000 kW</td><td>380.00</td><td>14.30</td><td>380.00</td><td>14.30</td><td>380.00</td><td>11.80</td><td>380.00</td><td>11.05</td><td>380.00</td><td>12.53</td></td<>	including 5000 kW	380.00	14.30	380.00	14.30	380.00	11.80	380.00	11.05	380.00	12.53
Time of Use (TOU) - Off-Peak         380.00         12.30         380.00         11.30         380.00         9.05         380.00         7.55         380.00         9.10           C3 Supply at 66 kV and above and sanctioned load above 5000 kW         360.00         14.20         360.00         14.20         360.00         11.70         360.00         10.95         360.00         12.43           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         360.00         12.20         360.00         11.20         360.00         8.85         360.00         7.35         360.00         8.88           AGRICULTURAL - TARIFF-D         SCARP         14.50         14.50         12.00         12.15         13.63           Time of Use (TOU) - Peak         14.50         14.50         12.00         15.15         16.63           GCARP         14.50         14.50         12.00         15.15         16.63           Time of Use (TOU) - Peak         200.00         11.20         200.00         8.85         200.00         7.35         200.00         8.95           Agricultural Tube-wells         200.00         14.00         200.00         11.50         200.00<	Time of Use (TOU) - Peak		18.00		17.50		15.00		15.15		16.63
C3 Supply at 66 kV and above and sanctioned load above 5000 kW         360.00         14.20         360.00         14.20         360.00         11.70         360.00         10.95         360.00         12.43           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         360.00         12.20         360.00         11.20         360.00         8.85         360.00         7.35         360.00         8.88           AGRICULTURAL - TARIFF-D         SCARP         14.50         14.50         12.00         12.15         13.63           Time of Use (TOU) - Peak         200.00         14.50         12.00         12.15         13.63           Time of Use (TOU) - Peak         14.50         14.50         12.00         15.15         16.63           Time of Use (TOU) - Peak         200.00         14.50         12.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         11.20         200.00         8.85         200.00         7.35         200.00         8.95           Agricultural Tube-wells         200.00         14.00         200.00         11.50         200.00         11.58           Time of Use (TOU) - Peak	Time of Use (TOU) - Off-Peak	380.00	12.30	380.00	11.30	380.00	9.05	380.00	7.55	380.00	9.10
and sanctioned load above 5000 kW       360.00       14.20       360.00       14.20       360.00       11.70       360.00       10.95       360.00       12.43         Time of Use (TOU) - Peak       18.00       17.50       15.00       15.15       16.63         Time of Use (TOU) - Off-Peak       360.00       12.20       360.00       11.20       360.00       8.85       360.00       7.35       360.00       8.88         AGRICULTURAL - TARIFF-D       5CARP       14.50       14.50       12.00       12.15       13.63         Time of Use (TOU) - Peak       14.50       14.50       12.00       15.15       16.63         SCARP       14.50       14.50       12.00       12.15       13.63         Time of Use (TOU) - Peak       200.00       11.20       200.00       8.85       200.00       7.35       200.00       8.95         Agricultural Tube-wells       200.00       14.00       200.00       14.50       200.00       11.50       200.00       10.10       200.00       11.58         Time of Use (TOU) - Off-Peak       200.00       14.00       200.00       11.50       200.00       10.10       200.00       11.58         Time of Use (TOU) - Peak       18.00 <td< td=""><td>C3 Supply at 66 kV and above</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></td<>	C3 Supply at 66 kV and above										1
kWImage: Image: Ima	and sanctioned load above 5000	360.00	14.20	360.00	14.20	360.00	11.70	360.00	10.95	360.00	12.43
Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Off-Peak360.0012.20360.0011.20360.008.85360.007.35360.008.88AGRICULTURAL - TARIFF-DSCARP14.5014.5012.0012.1513.63Time of Use (TOU) - Peak17.5015.0015.1516.63Time of Use (TOU) - Peak200.0011.20200.008.85200.007.35200.00Agricultural Tube-wells200.0014.00200.0011.50200.0010.10200.0011.58Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Peak200.0014.00200.0011.50200.0010.10200.00Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Off-Peak200.0012.20200.0011.20200.008.85200.007.35200.00Time of Use (TOU) - Off-Peak200.0012.20200.0011.20200.008.85200.007.35200.009.03	kW										
Time of Use (TOU) - Off-Peak         360.00         12.20         360.00         11.20         360.00         8.85         360.00         7.35         360.00         8.88           AGRICULTURAL - TARIFF-D         SCARP         14.50         14.50         12.00         12.15         13.63           Time of Use (TOU) - Peak         14.50         14.50         12.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         11.20         200.00         8.85         200.00         7.35         200.00         8.95           Agricultural Tube-wells         200.00         14.00         200.00         14.00         200.00         11.20         200.00         11.50         200.00         8.85         200.00         7.35         200.00         8.95           Agricultural Tube-wells         200.00         14.00         200.00         14.00         200.00         11.50         200.00         11.58           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         12.20         200.00         18.85         200.00         7.35         200.00         9.03	Time of Use (TOU) - Peak	1	18.00		17.50		15.00		15.15		16.63
AGRICULTURAL - TARIFF-D           SCARP         14.50         14.50         12.00         12.15         13.63           Time of Use (TOU) - Peak         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         11.20         200.00         8.85         200.00         7.35         200.00         8.95           Agricultural Tube-wells         200.00         14.00         200.00         14.00         200.00         11.50         200.00         10.10         200.00         11.58           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         12.20         200.00         18.85         200.00         7.35         200.00         9.03	Time of Use (TOU) - Off-Peak	360.00	12.20	360.00	11.20	360.00	8.85	360.00	7.35	360.00	8.88
SCARP         14.50         14.50         12.00         12.15         13.63           Time of Use (TOU) - Peak         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         11.20         200.00         8.85         200.00         7.35         200.00         8.95           Agricultural Tube-wells         200.00         14.00         200.00         14.00         200.00         11.50         200.00         10.10         200.00         11.58           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         12.20         200.00         11.20         200.00         8.85         200.00         7.35         200.00         9.03	AGRICULTURAL - TARIFF-D		•		•	•	•	•	•		
Time of Use (TOU) - Peak17.5015.0015.1516.63Time of Use (TOU) - Off-Peak200.0011.20200.008.85200.007.35200.008.95Agricultural Tube-wells200.0014.00200.0014.00200.0011.50200.0010.10200.0011.58Time of Use (TOU) - Peak18.0017.5015.0015.1516.63Time of Use (TOU) - Off-Peak200.0012.20200.0011.20200.008.85200.007.35200.009.03	SCARP		14.50		14.50		12.00		12.15		13.63
Time of Use (TOU) - Off-Peak         200.00         11.20         200.00         8.85         200.00         7.35         200.00         8.95           Agricultural Tube-wells         200.00         14.00         200.00         14.00         200.00         11.50         200.00         10.10         200.00         11.58           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         11.20         200.00         8.85         200.00         7.35         200.00         9.03	Time of Use (TOU) - Peak				17.50		15.00		15.15		16.63
Agricultural Tube-wells         200.00         14.00         200.00         14.00         200.00         11.50         200.00         10.10         200.00         11.58           Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         12.20         200.00         11.20         200.00         8.85         200.00         7.35         200.00         9.03	Time of Use (TOU) - Off-Peak			200.00	11.20	200.00	8.85	200.00	7.35	200.00	8.95
Time of Use (TOU) - Peak         18.00         17.50         15.00         15.15         16.63           Time of Use (TOU) - Off-Peak         200.00         12.20         200.00         11.20         200.00         8.85         200.00         7.35         200.00         9.03	Agricultural Tube-wells	200.00	14.00	200.00	14.00	200.00	11.50	200.00	10.10	200.00	11.58
Time of Use (TOU) - Off-Peak 200.00 12.20 200.00 11.20 200.00 8.85 200.00 7.35 200.00 9.03	Time of Use (TOU) - Peak		18.00		17.50		15.00		15.15		16.63
	Time of Use (TOU) - Off-Peak	200.00	12.20	200.00	11.20	200.00	8.85	200.00	7.35	200.00	9.03

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	201	2-13	201	3-14	201	4-15	2015	5-16*	2015	5-16 [*]
PARTICULARS	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable ***
PUBLIC LIGHTING - TARIFF-G		15.00		15.00		14.00		13.25		14.62
RESIDENTIAL COLONIES ATT. TO INDUSTRIES		15.00		15.00		14.00		13.25		14.62
SPECIAL CONTRACT - AJ&K - TARIFF-K	360.00	12.22	360.00	14.38	360.00	11.24	360.00	10.50	360.00	11.85
Time of Use (TOU) - Peak		18.00		17.50		15.00		15.15		16.52
Time of Use (TOU) - Off-Peak	360.00	12.20	360.00	11.20	360.00	8.85	360.00	7.45	360.00	8.82
SPECIAL CONTRACT - RAWAT LAB TARIFF-K		15.00		15.00		14.00		13.25		14.63
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above							360.00	10.95	360.00	12.43
Time of Use (TOU) - Peak								15.15		16.63
Time of Use (TOU) - Off-Peak							360.00	7.35	360.00	8.88
J-2 (a) For Supply at 11, 33 kV							380.00	11.05	380.00	12.53
Time of Use (TOU) - Peak								15.15		16.63
Time of Use (TOU) - Off-Peak							380.00	7.55	380.00	9.10
J-2 (b) For Supply at 66 kV and above	ve						360.00	10.95	360.00	12.43
Time of Use (TOU) - Peak								15.15		16.63
Time of Use (TOU) - Off-Peak							360.00	7.35	360.00	8.88
J-3 (a) For Supply at 11, 33 kV							380.00	11.05	380.00	12.53
Time of Use (TOU) - Peak								15.15		16.63
Time of Use (TOU) - Off-Peak							380.00	7.55	380.00	9.10
J-3 (b) For Supply at 66 kV and above	ve						360.00	10.95	360.00	12.43
Time of Use (TOU) - Peak								15.15		16.63
Time of Use (TOU) - Off-Peak							360.00	7.35	360.00	8.88
* Represents Multi Year Tariff Sche	edules.	** Fü	xed Charge	es (Rs./kW/	Month)	*** Va.	riable Char	ges (Rs./kV	Vh)	

* Represents Multi Year Tariff Schedules. ** Fixed Charges (Rs./kW/Mo * NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17.

Source: National Electric Power Regulatory Authority, Islamabad

### TABLE 76

#### COMPARATIVE TARIFF STATEMENT OF GUJRANWALA ELECTRIC POWER COMPANY LIMITED (GEPCO)

PARTICULARS	2012-13		2013-14		2014-15		2015-16		2015-16***	
	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable **	Fixed *	Variable	Fixed *	Variable **
RESIDENTIAL										
Up to 50 Units		4.00		4.00		4.00		4.00		4.00
For Peak Load requirement less than 5 kW										
01-100 Units		12.10		13.26		11.82		8.60		8.60
101-200 Units				16.90		14.00		10.25		10.61
201-300 Units		15.00		16.90		14.00		11.55		11.92
301-700 Units		17.00		17.90		17.00		14.50		14.78
Above 700 Units		19.00		19.00		19.00		15.20		15.41
For Peak Load requirement exceeding 5 kW										
Time of Use (TOU) - Peak		19.00		19.00		19.00		15.20		15.36
Time of Use (TOU) - Off-Peak		12.50		13.50		13.00		8.60		8.86
Temporary Supply								15.20		15.36
COMMERCIAL - A2										
For Peak Load requirement less than 5 kW		18.00		19.00		19.00		14.20		14.36
For Peak Load requirement exceeding 5 kW										
Regular	400.00	16.00	400.00	16.00	400.00	15.00	400.00	10.20	400.00	10.86
Time of Use (TOU) - Peak		19.00		19.00		19.00		15.20		15.36
Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	13.50	400.00	13.00	400.00	8.60	400.00	8.86
Temporary Supply								14.20		14.36
GENERAL SERVICES - A3								11.55		12.51
INDUSTRIAL										
B1	- to X	15.50		15.50		14.50	1	9.70		10.00
B1 (Peak)		19.00	1	19.00		19.00		15.20		15.36
B1 (Off-Peak)	14	12.50		13.50		13.00	1	8.60	, G	8.86
B2	400.00	15.00	400.00	15.00	400.00	14.00	400.00	9.20	400.00	9.36

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	2012-13		2013-14		2014-15		2015-16		2015-16***	
PARTICULARS	Fixed *	Variable **	Fixed *	Variable **	Fixed *	Variable	Fixed *	Variable **	Fixed *	Variable **
B2 - TOU (Peak)		19.00		19.00		19.00		15.20		15.36
B2 - TOU (Off-Peak)	400.00	12.30	400.00	13.30	400.00	12.80	400.00	8.40	400.00	8.66
B3 - TOU (Peak)		19.00		19.00		19.00		15.20		15.36
B3 - TOU (Off-Peak)	380.00	12.20	380.00	13.20	380.00	12.70	380.00	8.30	380.00	8.56
B4 - TOU (Peak)		19.00		19.00		19.00		15.20		15.36
B4 - TOU (Off-Peak)	360.00	12.10	360.00	13.10	360.00	12.60	360.00	8.20	360.00	8.46
Temporary Supply								9.70		9.86
BULK SUPPLY										
C1 (a) Supply at 400/230 Volts - less than 5 kW		15.00		16.00		15.00		10.20		10.36
C1 (b) Supply at 400/230 Volts - 5 kW and upto 500 kW	400.00	14.50	400.00	15.50	400.00	14.50	400.00	9.70	400.00	9.86
Time of Use (TOU) - Peak		19.00		19.00		19.00		15.20		15.36
Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	13.50	400.00	13.00	400.00	8.60	400.00	8.86
C2 Supply at 11, 33 kV upto and including 5000 kW	380.00	14.40	380.00	15.30	380.00	14.30	380.00	9.50	380.00	9.66
Time of Use (TOU) - Peak		19.00		19.00		19.00		15 20		15 36
Time of Use (TOU) - Off-Peak	380.00	12.30	380.00	13.00	380.00	12.80	380.00	8.40	380.00	8.66
C3 Supply at 66 kV and above and sanctioned load above 5000	360.00	14.30	360.00	15.20	360.00	14.20	360.00	9.40	360.00	9.56
kW										
Time of Use (TOU) - Peak		19.00		19.00		19.00		15.20		15.36
Time of Use (TOU) - Off-Peak	360.00	12.20	360.00	13.20	360.00	12.70	360.00	8.30	360.00	8.56
AGRICULTURAL - TARIFF-D						-				
SCARP		15.50		15.50		14.50		10.70		10.86
Time of Use (TOU) - Peak				19.00		19.00		15.20		15.36
Time of Use (TOU) - Off-Peak			200.00	13.20	200.00	12.70	200.00	8.30	200.00	8.56
Agricultural Tube-wells	200.00	15.00	200.00	15.00	200.00	14.00	200.00	9.60	200.00	9.86
Time of Use (TOU) - Peak		19.00		19.00		19.00		15.20		15.36
Time of Use (TOU) - Off-Peak	200.00	12.20	200.00	13.20	200.00	12.70	200.00	8.30	200.00	8.56
PUBLIC LIGHTING - TARIFF-G		15.00		15.00		14.00		9.20		9.36
RESIDENTIAL COLONIES ATT. TO INDUSTRIES		15.00		15.00		14.00		9.20		9.36
SPECIAL CONTRACT - AJ&K - TARIFF-K	360.00	13.33	360.00	15.00	360.00	14.00	360.00	9.20	360.00	9.36
Time of Use (TOU) - Peak		19.00		19.00		19.00		15.20		15.36
Time of Use (TOU) - Off-Peak	360.00	12.20	360.00	13.20	360.00	12.70	360.00	9.90	360.00	10.06
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above							360.00	9.40	360.00	9.56
Time of Use (TOU) - Peak								15.20		15.36
Time of Use (TOU) - Off-Peak							360.00	8.30	360.00	8.56
J-2 (a) For Supply at 11, 33 kV							380.00	9.50	380.00	9.66
Time of Use (TOU) - Peak								15.20		15.36
Time of Use (TOU) - Off-Peak							380.00	8.40	380.00	8.66
J-2 (b) For Supply at 66 kV and above							360.00	9.40	360.00	9.56
Time of Use (TOU) - Peak								15.20		15.36
Time of Use (TOU) - Off-Peak							360.00	8.30	360.00	8.56
J-3 (a) For Supply at 11, 33 kV							380.00	9.50	380.00	9.66
Time of Use (TOU) - Peak								15.20		15.36
Time of Use (TOU) - Off-Peak							380.00	8.40	380.00	8.66
J-3 (b) For Supply at 66 kV and above	ve						360.00	9.40	360.00	9.56
Time of Use (TOU) - Peak								15.20		15.36
Time of Use (TOU) - Off-Peak							360.00	8.30	360.00	8.56

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* Fixed Charges (Rs./kW/Month) ** Variable Charges (Rs./kWh) *** NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17. Source: National Electric Power Regulatory Authority, Islamabad
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COMPARATIVE TA	<b>RIFF STA</b>	TEMENT	OF LAHO	ORE ELEC	TRIC SUP	PLY COM	PANY LIN	1ITED (LE	SCO)	
	2012	2-13	201	3-14	2014	4-15	201	5-16*	2015	<u>5-16⁺</u>
PARTICULARS	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable	Fixed **	Variable	Fixed **	Variabl
RESIDENTIAL										
Up to 50 Units		4 00		4 00		4 00		4 00		4 00
For Peak Load requirement less that	an 5 kW									
01-100 Units		11 09		10.00		9 2 5		7 90		9 5 2
101-200 Units		11.05		12.33		11.00		9.90		11 32
201-300 Units		14 00		12.33		11.00		10.90		12 33
301-700 Units		17.00		15.00		13 33		12.20		14.08
Above 700 Units		18.00		17.50		15.00		14 35		16.04
For Peak Load requirement exceed	ina 5 kW	10.00		17.50		15.00		14.55		10.04
Time of Use (TOU) - Peak		18.00		17 50	1	15.00		14 35		16.04
Time of Use (TOU) - Off-Peak		12.50		11.50		9.50		7 90		9.5/
Temporary Supply		12.30		11.50		9.50		13.85		15 19
								15.05		15.15
For Peak Load requirement less										1
than 5 kW		18.00		17.50		16.00		14.05		15.73
For Peak Load requirement exceed	ing 5 kW									L
Regular	100.00	16.00	400.00	15.00	400.00	12.00	400.00	10.05	400.00	11 76
Time of Use (TOLI) - Peak	400.00	18.00	400.00	17.50	400.00	15.00	400.00	1/ 35	400.00	16.04
Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	11.50	400.00	9.50	400.00	7 90	400.00	9.54
Temporary Supply	400.00	12.30	400.00	11.50	400.00	9.30	400.00	14.05	400.00	15 7/
								14.05		13.74
								11.05		15.04
R1		14.50		14.50		12.00		10.05		11 7/
B1 (Popk)		19.00		14.30		12.00		14.25		16.04
B1 (Off Book)		12.50		11.50		9.50		7 00		0.04
	400.00	14.00	400.00	11.50	400.00	9.50	400.00	7.90	400.00	9.59
B2 TOLL (Book)	400.00	14.00	400.00	14.00	400.00	11.50	400.00	9.55	400.00	16.04
B2 - TOU (Peak)	400.00	12.00	400.00	11.30	400.00	0.20	400.00	7 70	400.00	0.26
B2 - TOU (UII-Peak)	400.00	12.30	400.00	17.50	400.00	9.30	400.00	14.25	400.00	9.30
B3 - TOU (Peak)	200.00	12.00	200.00	11.30	280.00	0.10	200.00	14.55	200.00	0.16
B3 - TOU (OII-Peak)	560.00	12.20	500.00	17.20	560.00	9.10	560.00	14.25	500.00	9.10
B4 - TOU (Peak)	200.00	10.00	200.00	17.50	200.00	15.00	200.00	14.35	200.00	16.04
В4 - ТОО (ОП-Реак)	360.00	12.10	360.00	11.10	360.00	9.00	360.00	10.05	360.00	9.04
								10.05		11.74
BULK SUPPLY		1		1						
less than 5 kW		15.00		15.00		12.50		10.55		12.24
C1 (b) Supply at 400/230 Volts - 5	400 00	14 50	400.00	14 50	400.00	12 00	400.00	10.05	400.00	1174
kW and upto 500 kW	100.00	11.50	100.00	11.50	100.00	12.00	100.00	10.05	100.00	
Time of Use (TOU) - Peak		18.00		17.50		15.00		14.35		16.04
Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	11.50	400.00	9.50	400.00	7.90	400.00	9.59
C2 Supply at 11, 33 kV upto and including 5000 kW	380.00	14.30	380.00	14.30	380.00	11.80	380.00	9.85	380.00	11.54
Time of Use (TOU) - Peak		18.00		17.50		15.00		14.35		16.04
Time of Use (TOU) - Off-Peak	380.00	12.30	380.00	11.30	380.00	9.30	380.00	7.70	380.00	9.36
C3 Supply at 66 kV and above										
and sanctioned load above 5000	360.00	14.20	360.00	14.20	360.00	11.70	360.00	9.75	360.00	11.44
kW										
Time of Use (TOU) - Peak		18.00		17.50		15.00		14.35		16.04
Time of Use (TOU) - Off-Peak	360.00	12.20	360.00	11.20	360.00	9.10	360.00	7.50	360.00	9.16
AGRICULTURAL - TARIFF-D										
SCARP		14.50		14.50		12.00		11.45		13.14
Time of Use (TOU) - Peak				17.50		15.00		14.35		16.04
Time of Use (TOU) - Off-Peak	1.4.44		200.00	11.20	200.00	9.10	200.00	7.50	200.00	9.14
Agricultural Tube-wells	200.00	14.00	200.00	14.00	200.00	11.50	200.00	11.80	200.00	13.44
Time of Use (TOU) - Peak	347	18.00	and the second s	17.50		15.00	1	14.35		16.04
Time of Use (TOU) - Off-Peak	200.00	12.20	200.00	11.20	200.00	9.10	200.00	7.50	200.00	9.14

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	201	2-13	201	3-14	2014	4-15	2015	-16*	201	5-16 [‡]
PARTICULARS	Fixed **	Variable	Fixed **	Variabl e ***	Fixed **	Variable ***	Fixed **	Variable	Fixed **	Variable ***
PUBLIC LIGHTING - TARIFF-G		15.00		15.00		14.00		12.20		14.84
RESIDENTIAL COLONIES ATT.		15.00		15.00		14.00		12 20		14.84
TO INDUSTRIES		15.00		13.00		14.00		12.20		14.04
RAILWAY TRACTION		15.00		15.00		14.00		12.20		14.84
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above							360.00	9.75	360.00	11.44
Time of Use (TOU) – Peak								14.35		16.04
Time of Use (TOU) - Off-Peak							360.00	7.50	360.00	9.16
J-2 (a) For Supply at 11, 33 kV							380.00	9.85	380.00	11.54
Time of Use (TOU) - Peak								14.35		16.04
Time of Use (TOU) - Off-Peak							380.00	7.70	380.00	9.36
J-2 (b) For Supply at 66 kV and above	ve						360.00	9.75	360.00	11.44
Time of Use (TOU) - Peak								14.35		16.04
Time of Use (TOU) - Off-Peak							360.00	7.50	360.00	9.16
J-3 (a) For Supply at 11, 33 kV							380.00	9.85	380.00	11.54
Time of Use (TOU) - Peak								14.35		16.04
Time of Use (TOU) - Off-Peak							380.00	7.70	380.00	9.36
J-3 (b) For Supply at 66 kV and abo	ve						360.00	9.75	360.00	11.44
Time of Use (TOU) - Peak								14.35		16.04
Time of Use (TOU) - Off-Peak							360.00	7.50	360.00	9.16
* Represents Multi Year Tariff Sche	edules.		** Fi	ked Charge	es (Rs./kW/	/Month)	*** Va	riable Cha	rges (Rs./k	Wh)

* Represents Multi Year Tariff Schedules. ** Fixed Charges ( * NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17.

Source: National Electric Power Regulatory Authority, Islamabad

*** Variable Charges (Rs./kWh)

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#### COMPARATIVE TARIFF STATEMENT OF FAISALABAD ELECTRIC SUPPLY COMPANY LIMITED (FESCO)

	201	2-13	201	3-14	201	4-15	201	5-16*	2015	5-16 [‡]
PARTICULARS	Fixed **	Variable								
RESIDENTIAL										
Up to 50 Units		4.00		4.00		4.00		4.00		4.00
For Peak Load requirement less that	n 5 kW									
01-100 Units		12.57		11.09		9.00		8.85		10.72
101-200 Units				14.00		10.20		12.10		14.23
201-300 Units		15.50		14.00		10.20		12.85		14.96
301-700 Units		17.50		15.00		14.00		13.30		15.40
Above 700 Units		19.50		17.50		16.00		14.40		16.51
For Peak Load requirement exceeding	ng 5 kW									
Time of Use (TOU) - Peak		19.50		17.50		16.00		14.40		16.51
Time of Use (TOU) - Off-Peak		12.90		11.50		10.00		8.85		9.36
Temporary Supply								14.40		16.51
COMMERCIAL - A2										
For Peak Load requirement less		19 50		17 50		15.00		13 30		15/11
than 5 kW		15.50		17.50		15.00		15.50		13.41
For Peak Load requirement exceeding	ng 5 kW									
Regular	400.00	16.00	400.00	15.00	400.00	14.50	400.00	13.30	400.00	15.26
Time of Use (TOU) - Peak		19.50		17.50		16.00		13.30		16.51
Time of Use (TOU) - Off-Peak	400.00	12.90	400.00	11.50	400.00	10.00	400.00	13.30	400.00	9.36
Temporary Supply								13.30		16.51
GENERAL SERVICES - A3								11.70		14.01
INDUSTRIAL										
B1		15.50		14.50		13.00		12.15		12.53
B1 (Peak)		19.50		17.50		16.00		14.40		16.23
B1 (Off-Peak)		12.90		11.50		10.00	1 1 1	7.95		8.46
B2	400.00	15.00	400.00	14.00	400.00	12.50	400.00	11.65	400.00	12.03
B2 - TOU (Peak)		19.50		17.50		16.00	12	14.40		16.23
B2 - TOU (Off-Peak)	400.00	12.70	400.00	11.30	400.00	9.60	400.00	7.85	400.00	8.36
B3 - TOU (Peak)		19.50		17.50		16.00		14.40		16.23
B3 - TOU (Off-Peak)	380.00	12.60	380.00	11.20	380.00	9.50	380.00	7.75	380.00	8.26

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	201	2-13	201	3-14	201	4-15	201	5-16*	2015	5-16 [‡]
PARTICULARS	Fixed **	Variable	Fixed **	Variable ***	Fixed **	Variable	Fixed **	Variable ***	Fixed **	Variable
B4 - TOU (Peak)		19.50		17.50		16.00		14.40		16.23
B4 - TOU (Off-Peak)	360.00	12.50	360.00	11.10	360.00	9.40	360.00	7.65	360.00	8.16
Temporary Supply								14.40		16.51
BULK SUPPLY										
C1 (a) Supply at 400/230 Volts -		15.00		15.00		13.50		12.65		13.03
C1 (b) Supply at 400/220 Volte 5										
kW and upto 500 kW	400.00	14.50	400.00	14.50	400.00	13.00	400.00	12.15	400.00	12.53
Time of Use (TOU) - Peak		19.50		17.50		16.00		14.40		16.23
Time of Use (TOU) - Off-Peak	400.00	12.90	400.00	11.50	400.00	10.00	400.00	7.95	400.00	8.46
C2 Supply at 11, 33 kV upto and						10.00		11.05		10.00
including 5000 kW	380.00	14.40	380.00	14.30	380.00	12.80	380.00	11.95	380.00	12.33
Time of Use (TOU) - Peak		19.50		17.50		16.00		14.40		16.23
Time of Use (TOU) - Off-Peak	380.00	12.80	380.00	11.30	380.00	9.60	380.00	7.75	380.00	8.26
C3 Supply at 66 kV and above and sanctioned load above 5000 kW	360.00	14.30	360.00	14.20	360.00	12.70	360.00	11.85	360.00	12.23
Time of Use (TOU) - Peak		19.50		17.50		16.00		14.40		16.23
Time of Use (TOU) - Off-Peak	360.00	12.70	360.00	11.20	360.00	9.50	360.00	7.65	360.00	8.16
AGRICULTURAL - TARIFF-D										
SCARP		15.50		14.50		13.00		11.95		12.33
Time of Use (TOU) - Peak				17.50		16.00		14.40		16.23
Time of Use (TOU) - Off-Peak			200.00	11.20	200.00	9.50	200.00	7.85	200.00	8.36
Agricultural Tube-wells	200.00	15.00	200.00	14.00	200.00	12.50	200.00	11.95	200.00	12.33
Time of Use (TOU) - Peak		19.50		17.50		16.00		14.40		16.23
Time of Use (TOU) - Off-Peak	200.00	12.70	200.00	11.20	200.00	9.50	200.00	7.85	200.00	8.36
PUBLIC LIGHTING - TARIFF-G		16.00		15.00		14.00		10.50		12.26
RESIDENTIAL COLONIES ATT.		10.00		15.00		14.00		10.50		12.20
TO INDUSTRIES		16.00		15.00		14.00		10.50		12.26
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above							360.00	11.85	360.00	12.23
Time of Use (TOU) – Peak								14.40		16.23
Time of Use (TOU) - Off-Peak							360.00	7.65	360.00	8.16
J-2 (a) For Supply at 11, 33 kV							380.00	11.95	380.00	12.33
Time of Use (TOU) - Peak								14.40		16.23
Time of Use (TOU) - Off-Peak							380.00	7.75	380.00	8.26
J-2 (b) For Supply at 66 kV and abo	ve						360.00	11.85	360.00	12.23
Time of Use (TOU) - Peak								14.40		16.23
Time of Use (TOU) - Off-Peak							360.00	7.65	360.00	8.16
J-3 (a) For Supply at 11, 33 kV							380.00	11.95	380.00	12.33
Time of Use (TOU) - Peak								14.40		16.23
Time of Use (TOU) - Off-Peak							380.00	7.75	380.00	8.26
J-3 (b) For Supply at 66 kV and abo	ve						360.00	11.85	360.00	12.23
Time of Use (TOU) - Peak								14.40		16.23
Time of Use (TOU) - Off-Peak							360.00	7.65	360.00	8.16
* Represents Multi Year Tariff Sche	dules.		** Fix	ed Charges	; (Rs./kW/l	Month)	*** Va	riable Charc	nes (Rs./kV	Vh)

* Represents Multi Year Tariff Schedules. * Fixed Charges (Rs./kW/Month) NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17.

Source: National Electric Power Regulatory Authority, Islamabad

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COMPARATIVE TA	RIFF STA	<b>TEMENT</b>	OF MULT	AN ELEC	<b>FRIC POV</b>	VER COM	PANY LIP	<b>MITED (M</b>	EPCO)	
	2012	2-13	201	3-14	201	4-15	201	5-16	2015	-16***
PARTICULARS	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable
	TINEU	**	TINEU	**	TINEU	**	Tixeu	**	Tixeu	**
RESIDENTIAL	1				1				1	
Up to 50 Units	L	4.00		4.00		4.00		4.00		4.00
For Peak Load requirement less that	n 5 kW	1	1				1	r	1	
01-100 Units		13.50		13.00		9.52		7.65		10.67
101-200 Units				16.90		12.00		10.85		12.17
201-300 Units		15.65		16.90		12.00		11.30		13.59
301-700 Units		17.65		17.90		15.00		13.40		16.21
Above 700 Units		19.50		19.00		16.00		16.00		17.73
For Peak Load requirement exceed	ing 5 kW									
Time of Use (TOU) - Peak		19.50		19.00		16.00		16.00		16.37
Time of Use (TOU) - Off-Peak		14.00		13.30		10.50		9.70		10.67
Temporary Supply								14.00		17.17
COMMERCIAL - A2										
For Peak Load requirement		10.50		10.00		16.00		16.40		15 77
less than 5 kW		19.50		19.00		16.00		16.40		15.77
For Peak Load requirement exceed	ing 5 kW									
Regular	400.00	16.00	400.00	16.00	400.00	14.00	400.00	14.40	400.00	13.77
Time of Use (TOU) - Peak		19.50		19.00		16.00		16.00		16.37
Time of Use (TOU) - Off-Peak	400.00	14.00	400.00	13.30	400.00	10.50	400.00	9.70	400.00	10.67
Temporary Supply								16.40		15.77
GENERAL SERVICES - A3								11.50		15.47
INDUSTRIAL								1.1.5 0	l	
B1		15 50		15 50		13 50		13 90		13.27
B1 (Peak)		19.50		19.00		16.00		16.00		16.37
B1 (Off-Peak)		14.00		13.00		10.00		9.70		10.57
B2	400.00	15.00	400.00	15.00	400.00	13.00	400.00	13.70	400.00	12.77
B2 - TOU (Peak)	400.00	19.00	400.00	19.00	400.00	16.00	400.00	16.00	400.00	16.37
B2 TOU (Off Book)	400.00	12.30	400.00	12.00	400.00	10.00	400.00	0.00	400.00	10.37
B2 - TOU (OII-Peak)	400.00	10.00	400.00	10.00	400.00	16.00	400.00	9.50	400.00	16.27
B3 - TOU (Peak)	280.00	12.30	200.00	12.00	200.00	10.00	200.00	0.00	200.00	10.37
B3 - TOU (OII-Peak)	560.00	10.0	500.00	10.00	560.00	16.00	500.00	9.40	560.00	16.37
B4 - TOU (Peak)	200.00	19.50	200.00	19.00	200.00	10.00	200.00	16.00	200.00	10.37
B4 - TOU (Off-Peak)	360.00	13.60	360.00	12.90	360.00	10.10	360.00	9.30	360.00	10.27
Temporary Supply								13.90		13.27
	1			1				r		
Volts - less than 5 kW		15.00		16.00		14.00		14.40		13.77
C1 (b) Supply at 400/230 Volts - 5 kW and upto 500 kW	400.00	14.50	400.00	15.50	400.00	13.50	400.00	13.90	400.00	13.27
Time of Use (TOU) - Peak		19.50		19.00		16.00		16.00		16.37
Time of Use (TOU) - Off-Peak	400.00	14.00	400.00	13.30	400.00	10.50	400.00	9.70	400.00	10.67
C2 Supply at 11, 33 kV upto										
and including 5000 kW	380.00	14.40	380.00	15.30	380.00	13.30	380.00	13.70	380.00	13.07
Time of Use (TOU) - Peak		19.50		19.00		16.00		16.00		16.37
Time of Use (TOU) - Off-Peak	380.00	13.90	380.00	13.10	380.00	10.30	380.00	9.50	380.00	10.47
C3 Supply at 66 kV and above	500.00	10.00	500.00		500.00		500.00	5150	500.00	
and sanctioned load above	360.00	14 30	360.00	15 20	360.00	13 20	360.00	13 60	360.00	12 97
5000 kW	500.00	11.50	500.00	13.20	500.00	13.20	500.00	15.00	500.00	12.57
Time of Use (TOU) - Peak		19 50		19.00		16.00		16.00		16 37
Time of Use (TOU) - Off-Peak	360.00	13.80	360.00	13.00	360.00	10.00	360.00	9.40	360.00	10.37
AGRICULTURAL - TARIFE-D	500.00	13.00	500.00	15.00	500.00	10.20	500.00	5.40	500.00	10.57
SCARP	1	15 50		15 50		13 50		13.45		13.82
Time of Use (TOLI) - Peak		13.30		19.00		16.00		16.00		16.37
Time of Use $(TOU) = Off_{Dock}$			200.00	13.00	200.00	10.00	200.00	Q 10	200.00	10.37
Agricultural Tube wells	200.00	15.00	200.00	15.00	200.00	12.00	200.00	1105	200.00	15.02
Time of Use (TOL) Book	200.00	10 50	200.00	10.00	200.00	16.00	200.00	14.00	200.00	16.27
Time of Use (TOU) - Peak	200.00	12.00	200.00	12.00	200.00	10.00	200.00	10.00	200.00	10.37
Tune of Use (TOU) - OTT-Peak	200.00	13.80	200.00	13.00	200.00	10.20	200.00	9.40	200.00	10.37

TABLE 79

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	201	2-13	201	3-14	201	4-15	201	5-16	2015	-16***
PARTICULARS	Fixed *	Variable **								
PUBLIC LIGHTING – TARIFF-G		16.00		15.00		14.00		14.40		13.77
RESIDENTIAL COLONIES ATT. TO INDUSTRIES		16.00		15.00		14.00		14.40		13.77
RAILWAY TRACTION		16.00		15.00		14.00		14.40		-
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above							360.00	13.60	360.00	12.97
Time of Use (TOU) - Peak								16.00		16.37
Time of Use (TOU) - Off-Peak							360.00	9.40	360.00	10.37
J-2 (a) For Supply at 11, 33 kV							380.00	13.70	380.00	13.07
Time of Use (TOU) - Peak								16.00		16.37
Time of Use (TOU) - Off-Peak							380.00	9.50	380.00	10.47
J-2 (b) For Supply at 66 kV and above	e						360.00	13.60	360.00	12.97
Time of Use (TOU) - Peak								16.00		16.37
Time of Use (TOU) - Off-Peak							360.00	9.40	360.00	10.37
J-3 (a) For Supply at 11, 33 kV							380.00	13.70	380.00	13.07
Time of Use (TOU) - Peak								16.00		16.37
Time of Use (TOU) - Off-Peak							380.00	9.50	380.00	10.47
J-3 (b) For Supply at 66 kV and above	e						360.00	13.60	360.00	12.97
Time of Use (TOU) - Peak								16.00		16.37
Time of Use (TOU) - Off-Peak							360.00	9.40	360.00	10.37

* Fixed Charges (Rs./kW/Month) ** Variable Charges (Rs./kWh) *** NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17.

Source: National Electric Power Regulatory Authority, Islamabad

TABLE 80

#### COMPARATIVE TARIFF STATEMENT OF HYDERABAD ELECTRIC SUPPLY COMPANY LIMITED (HESCO)

	201	2-13	201	3-14	201	4-15	201	5-16	2015-	16***
PARTICULARS	Fixed *	Variable **	Fixed *	Variable **	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable **
RESIDENTIAL										
Up to 50 Units		4.00		4.00		4.00		4.00		4.00
For Peak Load requirement less tha	n 5 kW									
01-100 Units		15.00		11.06		9.79		10.50		16.46
101-200 Units				12.50		14.00		14.50		19.96
201-300 Units		17.24		12.50		14.00		14.55		20.36
301-700 Units		18.50		15.50		15.00		15.50		20.97
Above 700 Units		20.50		17.50		16.00		16.50		21.97
For Peak Load requirement exceedi	ng 5 kW									
Time of Use (TOU) - Peak		20.50		17.50		16.00		16.50		21.96
Time of Use (TOU) - Off-Peak		15.50		11.50		10.20		10.70		16.46
Temporary Supply								16.50		22.26
COMMERCIAL - A2										
For Peak Load requirement		20.50		17 50		15.00		15 50		21.26
less than 5 kW		20.30		17.50		15.00		15.50		21.20
For Peak Load requirement exceedi	ng 5 kW									
Regular	400.00	19.00	400.00	15.00	400.00	13.00	400.00	13.50	400.00	19.26
Time of Use (TOU) - Peak		20.50		17.50		16.00		16.50		21.96
Time of Use (TOU) - Off-Peak	400.00	15.50	400.00	11.50	400.00	10.20	400.00	10.70	400.00	16.46
Temporary Supply								15.50		21.26
GENERAL SERVICES - A3								13.65		17.86
INDUSTRIAL										
B1		17.00		14.50		12.50		13.00		18.76
B1 (Peak)		20.50		17.50		16.00		16.50		21.96
B1 (Off-Peak)		15.50		11.50		10.20		10.70		16.46
B2	400.00	16.50	400.00	14.00	400.00	12.00	400.00	12.50	400.00	18.26
B2 - TOU (Peak)		20.50	and the second	17.50		16.00		16.50		21.96
B2 - TOU (Off-Peak)	400.00	15.30	400.00	11.30	400.00	10.00	400.00	10.50	400.00	16.26
B3 - TOU (Peak)	20.13	20.50		17.50		16.00		16.50		21.96

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	2012	2-13	201	3-14	2014	4-15	2015	5-16	2015-	16***
PARTICULARS	Fixed *	Variable **								
B3 - TOU (Off-Peak)	380.00	15.20	380.00	11.20	380.00	9.80	380.00	10.30	380.00	16.06
B4 - TOU (Peak)		20.50		17.50		16.00		16.50		21.96
B4 - TOU (Off-Peak)	360.00	15.10	360.00	11.10	360.00	9.70	360.00	10.20	360.00	15.96
Temporary Supply								13.00		18.76
BULK SUPPLY										
C1 (a) Supply at 400/230 Volts - less than 5 kW		17.50		15.00		13.00		13.50		19.26
C1 (b) Supply at 400/230 Volts - 5 kW and upto 500 kW	400.00	16.50	400.00	14.50	400.00	12.50	400.00	13.00	400.00	18.76
Time of Use (TOU) - Peak		20.50		17.50		16.00		16.50		21.96
Time of Use (TOU) - Off-Peak	400.00	15.50	400.00	11.50	400.00	10.20	400.00	10.70	400.00	16.46
C2 Supply at 11, 33 kV upto	380.00	16.30	380.00	14.30	380.00	12.30	380.00	12.80	380.00	18.56
Time of Use (TOU) - Peak		20.50		17.50		16.00		16.50		21.96
Time of Use (TOU) - Off-Peak	380.00	15.40	380.00	11.30	380.00	10.00	380.00	10.50	380.00	16.26
C3 Supply at 66 kV and above and sanctioned load above 5000 kW	360.00	16.20	360.00	14.20	360.00	12.20	360.00	12.70	360.00	18.46
Time of Use (TOU) - Peak		20.50		17 50		16.00		16 50		21.96
Time of Use (TOU) - Off-Peak	360.00	15 30	360.00	11.30	360.00	9.80	360.00	10.30	360.00	16.06
AGRICULTURAL - TARIFE-D	500.00	15.50	500.00	11.20	300.00	5.00	300.00	10.50	500.00	10.00
SCARP		17.00		14 50		12 50		13.00		18 76
Time of Use (TOU) - Peak		17.00		17.50		16.00		16.50		21.96
Time of Use (TOU) - Off-Peak			200.00	11.30	200.00	9.80	200.00	10.30	200.00	16.06
Agricultural Tube-wells	200.00	16 50	200.00	14.00	200.00	12 00	200.00	12 50	200.00	18.26
Time of Use (TOU) - Peak	200.00	20.50	200.00	17.50	200.00	16.00	200.00	16.50	200.00	21.96
Time of Use (TOU) - Off-Peak	200.00	15 30	200.00	11.20	200.00	9.80	200.00	10.30	200.00	16.06
PUBLIC LIGHTING -	200.00		200.00		200.00	5.00	200.00		200.00	
TARIFF-G		17.00		15.00		14.00		14.50		20.26
RESIDENTIAL COLONIES		1= 00		45.00						
ATT. TO INDUSTRIES		17.00		15.00		14.00		14.50		20.26
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above							360.00	12.70	360.00	18.46
Time of Use (TOU) - Peak								16.50		21.96
Time of Use (TOU) - Off-Peak							360.00	10.30	360.00	16.06
J-2 (a) For Supply at 11, 33 kV							380.00	12.80	380.00	18.56
Time of Use (TOU) - Peak								16.50		21.96
Time of Use (TOU) - Off-Peak							380.00	10.50	380.00	16.26
J-2 (b) For Supply at 66 kV and abo	ve						360.00	12.70	360.00	18.46
Time of Use (TOU) - Peak								16.50		21.96
Time of Use (TOU) - Off-Peak							360.00	10.30	360.00	16.06
J-3 (a) For Supply at 11, 33 kV							380.00	12.80	380.00	18.56
Time of Use (TOU) - Peak								16.50		21.96
Time of Use (TOU) - Off-Peak							380.00	10.50	380.00	16.26
J-3 (b) For Supply at 66 kV and abo	ve						360.00	12.70	360.00	18.46
Time of Use (TOU) - Peak								16.50		21.96
Time of Use (TOU) - Off-Peak							360.00	10.30	360.00	16.06

* Fixed Charges (Rs./kW/Month) ** Variable Charges (Rs./kWh) *** NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17. Source: National Electric Power Regulatory Authority, Islamabad

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COMPARATIVE T	ARIFF STA	ATEMENT	OF SUKK		TRIC SUP	PLY COM	PANY LI	MITED (SE	PCO)	
	201	2-13	201.	3-14	201	4-15	201	5-16	2015-	16***
PARTICULARS	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable
RESIDENTIAL										4
Up to 50 Units		4 00		4 00		4 00		4 00		4 00
For Peak Load requirement less th	an 5 kW									
01-100 Units		15.00		10.50		11.00		9.95		14.26
101-200 Units				12.50		13.52		11.50		15.56
201-300 Units		16.00		12.50		13.52		12.70		18.26
301-700 Units		17.00		15.50		16.00		16.55		20.11
Above 700 Units		20.00		17.50		19.00		19.90		22.46
For Peak Load requirement exceed	ling 5 kW									
Time of Use (TOU) - Peak	J	20.00		17.50		19.00		19.90		22.45
Time of Use (TOU) - Off-Peak		15.50		11.50		13.00		13.95		16.50
Temporary Supply								17.55		20.10
COMMERCIAL - A2										
For Peak Load requirement less		20.00		17.0		10.00		10.00		22.25
than 5 kW		20.00		17.50		19.00		19.60		22.35
For Peak Load requirement exceed	ling 5 kW									
Regular	400.00	19.00	400.00	15.00	400.00	15.00	400.00	17.80	400.00	20.35
Time of Use (TOU) - Peak		20.00		17.50		19.00		19.90		22.45
Time of Use (TOU) - Off-Peak	400.00	15.50	400.00	11.50	400.00	13.00	400.00	13.95	400.00	16.50
Temporary Supply								19.80		22.35
GENERAL SERVICES - A3								15.00		17.68
INDUSTRIAL		-								
B1		17.00		14.50		14.50		17.30		19.85
B1 (Peak)		20.00		17.50		19.00		19.90		22.45
B1 (Off-Peak)		15.50		11.50		13.00		13.95		16.50
B2	400.00	16.50	400.00	14.00	400.00	14.00	400.00	16.80	400.00	19.35
B2 - TOU (Peak)		20.00		17.50		19.00		19.90		22.45
B2 - TOU (Off-Peak)	400.00	15.30	400.00	11.30	400.00	12.80	400.00	13.75	400.00	16.30
B3 - TOU (Peak)	200.00	20.00	200.00	17.50	200.00	19.00	200.00	19.90	200.00	22.45
B3 - TOU (Off-Peak)	380.00	15.20	380.00	11.20	380.00	12.70	380.00	13.65	380.00	16.20
B4 - TOU (Peak)	260.00	20.00	260.00	17.50	260.00	19.00	260.00	19.90	260.00	22.45
B4 - TOU (Off-Peak)	360.00	15.10	360.00	11.10	360.00	12.60	360.00	13.55	360.00	16.10
Temporary Supply								17.30		19.85
BULK SUPPLY										1
less than 5 kW		17.50		15.00		15.00		17.80		20.35
C1 (b) Supply at 400/230 Volts -	400.00	16.50	400.00	14.50	400.00	14.50	400.00	17.30	400.00	19.85
5 kW and upto 500 kW				1		10.00		10.00		
Time of Use (TOU) - Peak	100.00	20.00	100.00	17.50	100.00	19.00	100.00	19.90	100.00	22.45
Time of Use (TOU) - Off-Peak	400.00	15.50	400.00	11.50	400.00	13.00	400.00	13.95	400.00	16.50
C2 Supply at 11, 33 kV upto and including 5000 kW	380.00	16.30	380.00	14.30	380.00	14.30	380.00	17.10	380.00	19.65
Time of Use (TOU) - Peak		20.00		17.50		19.00		19.90		22.45
Time of Use (TOU) - Off-Peak	380.00	15.40	380.00	11.30	380.00	12.80	380.00	13.75	380.00	16.30
C3 Supply at 66 kV and above										
and sanctioned load above 5000	360.00	16.20	360.00	14.20	360.00	14.20	360.00	17.00	360.00	19.55
kW										
Time of Use (TOU) - Peak		20.00		17.50		19.00		19.90		22.45
Time of Use (TOU) - Off-Peak	360.00	15.30	360.00	11.20	360.00	12.70	360.00	13.65	360.00	16.20
AGRICULTURAL - TARIFF-D		17.00		12.00		15.50		16.40		10.05
		17.00		13.60		15.50		16.40		18.95
Time of Use (TOU) - Peak			200.00	11.50	200.00	19.00	200.00	19.90	200.00	22.45
Agricultural Tube	200.00	10.50	200.00	11.20	200.00	12.70	200.00	13.65	200.00	10.20
Time of Lice (TOLI) - Deale	200.00	10.50	200.00	13.00	200.00	15.00	200.00	10.00	200.00	10.50
Time of Use (TOU) - Peak	200.00	20.00	200.00	11.50	200.00	19.00	200.00	19.90	200.00	22.45
Turne of Use (TOU) - Off-Peak	200.00	15.30	200.00	11.20	200.00	12.70	200.00	13.05	200.00	10.20

TABLE 81

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	2012	2-13	201	3-14	201	4-15	201	5-16	2015-	16***
PARTICULARS	Fixed *	Variable **								
PUBLIC LIGHTING - TARIFF-G		15.90		15.00		14.00		16.80		19.35
RESIDENTIAL COLONIES ATT.		15.00		15.00		14.00		16.80		10.25
TO INDUSTRIES		13.90		15.00		14.00		10.00		19.55
SPECIAL CONTRACT - TARIFF-J										
J-1 For Supply at 66 kV and above	2						360.00	17.00	360.00	19.55
Time of Use (TOU) - Peak								19.90		22.45
Time of Use (TOU) - Off-Peak							360.00	13.65	360.00	16.20
J-2 (a) For Supply at 11, 33 kV							380.00	17.10	380.00	19.65
Time of Use (TOU) - Peak								19.90		22.45
Time of Use (TOU) - Off-Peak							380.00	13.75	380.00	16.30
J-2 (b) For Supply at 66 kV and ab	ove						360.00	17.00	360.00	19.55
Time of Use (TOU) - Peak								19.90		22.45
Time of Use (TOU) - Off-Peak							360.00	13.65	360.00	16.20
J-3 (a) For Supply at 11, 33 kV							380.00	17.10	380.00	19.65
Time of Use (TOU) - Peak								19.90		22.45
Time of Use (TOU) - Off-Peak							380.00	13.75	380.00	16.30
J-3 (b) For Supply at 66 kV and ab	ove						360.00	17.00	360.00	19.55
Time of Use (TOU) - Peak								19.90		22.45
Time of Use (TOU) - Off-Peak							360.00	13.65	360.00	16.20

* Fixed Charges (Rs./kW/Month) **Variable Charges (Rs./kWh) *** NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17. Source: National Electric Power Regulatory Authority, Islamabad

TABLE 82

#### COMPARATIVE TARIFF STATEMENT OF OUETTA ELECTRIC SUPPLY COMPANY LIMITED (OESCO)

	201	2-13	201	3-14	201	4-15	201	5-16	2015-	16***
PARTICULARS	Fixed *	Variable **	Fixed *	Variable **	Fixed *	Variable **	Fixed *	Variable **	Fixed *	Variable
RESIDENTIAL										
Up to 50 Units		4.00		4.00		4.00		4.00		4.00
For Peak Load requirement less t	han 5 kW									
01-100 Units		11.00		10.50		12.50		9.70		9.71
101-200 Units				12.50		15.00		12.10		12.12
201-300 Units		14.00		12.50		15.00		12.15		12.17
301-700 Units		16.00		15.00		17.00		14.10		14.12
Above 700 Units		18.00		17.50		19.00		16.10		16.12
For Peak Load requirement excee	eding 5 kW									
Time of Use (TOU) - Peak		18.00		17.50		19.00		16.10		16.12
Time of Use (TOU) - Off-Peak		12.50		11.50		13.00		9.70		9.72
Temporary Supply								16.10		16.12
COMMERCIAL - A2										
For Peak Load requirement less		18.00		17 50		19.00		16 10		16 12
than 5 kW		10.00		17.50		15.00		10.10		10.12
For Peak Load requirement excee	eding 5 kW									
Regular	400.00	16.00	400.00	15.00	400.00	15.00	400.00	12.10	400.00	12.12
Time of Use (TOU) - Peak		18.00		17.50		19.00		16.10		16.12
Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	11.50	400.00	13.00	400.00	9.70	400.00	9.72
Temporary Supply								16.10		16.12
GENERAL SERVICES - A3								13.05		13.07
INDUSTRIAL										
B1		14.50		14.50		14.50		11.60		11.62
B1 (Peak)		18.00		17.50		19.00		16.10		16.12
B1 (Off-Peak)		12.50		11.50		13.00	100	9.70		9.72
B2	400.00	14.00	400.00	14.00	400.00	14.00	400.00	11.10	400.00	11.12
B2 - TOU (Peak)		18.00		17.50		19.00		16.10		16.12
B2 - TOU (Off-Peak)	400.00	12.30	400.00	11.30	400.00	12.80	400.00	9.50	400.00	9.52
B3 - TOU (Peak)		18.00		17.50	and the second s	19.00	-42 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	16.10		16.12
B3 - TOU (Off-Peak)	380.00	12.20	380.00	11.20	380.00	12.70	380.00	9.40	380.00	9.42
B4 - TOU (Peak)		18.00		17.50		19.00	37N -	16.10		16.12

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	2012	2-13	201	3-14	201	4-15	201	5-16	2015-	16***
PARTICULARS	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable	Fixed *	Variable
B4 - TOU (Off-Peak)	360.00	12 10	360.00	**	360.00	** 12.60	360.00	** 9 30	360.00	** 9 32
Temporary Supply	500.00	12.10	500.00	11.10	500.00	12.00	500.00	11.60	500.00	11.62
BULK SUPPLY								11.00		11.02
C1 (a) Supply at 400/230 Volts										
- less than 5 kW		15.00		15.00		15.00		12.10		12.12
C1 (b) Supply at 400/230 Volts - 5 kW and upto 500 kW	400.00	14.50	400.00	14.50	400.00	14.50	400.00	11.60	400.00	11.62
Time of Use (TOU) - Peak		18.00		17.50		19.00		16.10		16.12
Time of Use (TOU) - Off-Peak	400.00	12.50	400.00	11.50	400.00	13.00	400.00	9.70	400.00	9.72
C2 Supply at 11, 33 kV upto and including 5000 kW	380.00	14.30	380.00	14.30	380.00	14.30	380.00	11.40	380.00	11.42
Time of Use (TOU) - Peak		18.00		17.50		19.00		16.10		16.12
Time of Use (TOU) - Off-Peak	380.00	12.30	380.00	11.30	380.00	12.80	380.00	9.50	380.00	9.52
C3 Supply at 66 kV and above and sanctioned load above	360.00	14.20	360.00	14.20	360.00	14.20	360.00	11.30	360.00	11.32
Time of Use (TOU) - Peak		18.00		17 50		19.00		16 10		16 12
Time of Use (TOU) - Off-Peak	360.00	12.20	360.00	11.30	360.00	12.70	360.00	9.40	360.00	9.42
AGRICULTURAL - TARIFF-D	500.00	12.20	500.00	11.20	500.00	12.70	500.00	5.10	500.00	5.1E
SCARP		13.01		14.00		15.20		12.30		12.32
Time of Use (TOU) - Peak				17.50		19.00		16.10		16.12
Time of Use (TOU) - Off-Peak			200.00	11.20	200.00	12.70	200.00	9.40	200.00	9.42
Agricultural Tube-wells	200.00	11.51	200.00	13.61	200.00	14.70	200.00	11.80	200.00	11.84
Time of Use (TOU) - Peak		17.00		17.50		19.00		16.10		16.12
Time of Use (TOU) - Off-Peak	200.00	10.00	200.00	11.20	200.00	12.70	200.00	9.40	200.00	9.42
PUBLIC LIGHTING - TARIFF-G		15.00		15.00		14.00		11.10		11.12
RESIDENTIAL COLONIES ATT.		15.00		15.00		14.00		11.10		11.12
SPECIAL CONTRACT - TARIFF-J	•						260.00	11.20	260.00	11 22
Time of Lice (TOLI) Book	e	ł					500.00	16.10	500.00	16.12
Time of Use (TOU) - Peak		ł				-	260.00	9.40	260.00	0.12
$I_{12}$ (a) For Supply at 11 33 kV		ł				-	380.00	9.40	380.00	9.42 11.42
Time of Lise (TOLI) - Peak		+				-	300.00	16.10	300.00	16.12
Time of Use (TOU) - Off-Peak		ł					380.00	9.50	380.00	9.52
I-2 (b) For Supply at 66 kV and al	nove	ł				-	360.00	11 30	360.00	11 32
Time of Use (TOU) - Peak	0010	ł				-	500.00	16.10	500.00	16.12
Time of Use (TOU) - Off-Peak		ł					360.00	940	360.00	9.42
J-3 (a) For Supply at 11, 33 kV		1					380.00	11 40	380.00	11 42
Time of Use (TOU) - Peak		1					000100	16.10	000.00	16.12
Time of Use (TOU) - Off-Peak		1				ŀ	380.00	9.50	380.00	9.52
J-3 (b) For Supply at 66 kV and al	oove	1					360.00	11.30	360.00	11.32
Time of Use (TOU) - Peak		1						16.10		16.12
Time of Use (TOU) - Off-Peak		1					360.00	9.40	360.00	9.42

* Fixed Charges (Rs./kW/Month) ** Variable Charges (Rs./kWh) *** NEPRA Determined Tariff FY 2015-16 with periodic adjustment of FY 2016-17. Source: National Electric Power Regulatory Authority, Islamabad

1	4				Mon	thly Source	-wise Pow	er Sent Out	and Fuel (	Cost (2017-	-18)				
			July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
١	Gene-	GWh	3,847.55	4,196.51	4, 142.64	2,438.39	2,212.47	1,231.53	606.34	1,356.59	872.44	1,527.84	2,217.61	3,589.02	28,238.96
ləb	ration	%	30.79	32.90	36.06	23.96	30.86	15.86	7.60	19.44	9.98	15.07	18.30	27.79	23.39
нÀ	Fuel	Mln.Rs.	1	1	1	I	1	1	1	1	1	1	'	I	•
T. Charles	Cost	Rs./kWh	1	1	1	I	1	1	I	1	1	1	'	I	•
	Gene-	GWh	368.05	405.07	551.18	687.36	961.75	909.59	1,144.86	1,102.03	1,263.58	1,401.61	1,468.95	1,522.47	11,786.50
Je	ration	%	2.95	3.18	4.80	6.75	13.41	11.72	14.34	15.79	14.46	13.83	12.12	11.79	9.76
00	Fuel	Mln.Rs.	1,568.47	1,738.27	2,363.41	2,949.37	4,127.17	3,903.34	5,844.27	6,040.13	7,747.36	7,962.55	8,375.82	8,740.89	61,361.06
5	Cost	Rs./kWh	4.26	4.29	4.29	4.29	16.43	4.29	5.10	5.48	6.13	5.68	'	5.74	5.21
	Gene-	GWh	335.59	335.99	60.25	1	1	51.47	1	0.77	'	0.12	'	3.99	788.18
d	ration	%	2.69	2.63	0.52	1	1	0.66	1	0.01	'	0.00	'	0.03	0.65
SH	Fuel	Mln.Rs.	4,712.53	4,536.23	852.75	1	'	747.75	1	10.96	'	1.99	'	46.93	10,909.14
	Cost	Rs./kWh	14.04	13.50	14.15	1	I	14.53	ı	14.18	ı	16.89	I	11.76	13.84
	Gene-	GWh	3,198.50	3,122.95	2,328.48	2,547.48	648.50	2,251.45	1,630.46	581.39	1,410.35	1,550.54	2,338.23	1,162.50	22,770.84
0:	ration	%	25.59	24.49	20.27	25.03	9.04	29.00	20.43	8.33	16.14	15.30	19.30	9.00	18.86
RF	Fuel	Mln.Rs.	29,762.25	29,324.12	22,221.43	24,830.52	5,857.01	22,064.27	16,994.60	5,912.04	15,274.52	17,400.75	29,163.34	15,256.12	234,060.97
	Cost	Rs./kWh	9.31	9.39	9.54	9.75	9.03	9.80	10.42	10.17	10.83	11.22	12.47	13.12	10.28
	Gene-	GWh	2,145.17	2,146.31	1,882.79	1,863.17	1,778.11	1,767.59	1,851.65	1,672.87	1,860.06	1,646.04	1,971.34	2,026.03	22,611.11
se	ration	%	17.17	16.83	16.39	18.31	24.80	22.77	23.20	23.97	21.28	16.24	16.27	15.69	18.73
29	Fuel	Mln.Rs.	9,364.42	9,386.83	8,194.18	8,418.12	8,043.50	7,750.86	22,365.13	7,457.65	8,335.16	8,123.23	9,553.22	9,448.57	116,440.88
	Cost	Rs./kWh	4.37	4.37	4.35	4.52	4.52	4.38	12.08	4.46	4.48	4.94	4.85	4.66	5.15
-	Gene-	GWh	1,514.50	1,369.20	1,326.37	1,492.74	669.86	395.06	1,602.90	1,340.07	2,126.10	2,699.08	2,890.17	3,252.28	20,678.32
ÐN	ration	%	12.12	10.74	11.54	14.67	9.34	5.09	20.08	19.20	24.32	26.63	23.85	25.18	17.13
צרו	Fuel	Mln.Rs.	11,394.30	10,230.56	10,656.45	11,755.54	5,287.83	2,502.74	1	12,088.60	18,824.07	23,977.31	26,234.47	30,267.70	163,219.57
	Cost	Rs./kWh	7.52	7.47	8.03	7.88	7.89	6.34	1	9.02	8.85	8.88	9.08	9.31	7.89
J.	Gene-	GWh	641.59	736.33	777.55	837.60	634.21	728.06	820.98	609.23	786.18	835.95	656.17	656.03	8,719.87
eəl	ration	%	5.13	5.77	6.77	8.23	8.84	9.38	10.29	8.73	8.99	8.25	5.41	5.08	7.22
on	Fuel	Mln.Rs.	621.94	709.95	746.88	808.87	654.22	746.60	859.99	654.85	820.12	869.39	618.82	609.75	8,721.37
N	Cost	Rs./kWh	0.97	0.96	0.96	0.97	1.03	1.03	1.05	1.07	1.04	1.04	0.94	0.93	1.00
1	Gene-	GWh	54.28	52.65	49.21	48.62	40.63	38.82	37.93	34.53	42.17	49.40	53.63	52.89	554.74
ue 100	ration	%	0.43	0.41	0.43	0.48	0.57	0.50	0.48	0.49	0.48	0.49	0.44	0.41	0.46
am Tra	Fuel	Mln.Rs.	576.95	559.69	523.08	516.79	431.93	412.69	419.36	381.70	466.17	571.55	620.50	611.95	6,092.37
	Cost	Rs./kWh	10.63	10.63	10.63	10.63	10.63	10.63	11.06	11.06	11.06	11.57	11.57	11.57	10.98
F	Gene-	GWh	26.69	31.02	56.68	56.80	56.13	65.35	72.40	61.13	68.81	58.37	57.08	55.06	665.53
хөс	ration	%	0.21	0.24	0.49	0.56	0.78	0.84	0.91	0.88	0.79	0.58	0.47	0.43	0.55
лM	Fuel	Mln.Rs.	183.38	210.96	383.88	388.93	381.82	441.99	494.68	414.03	468.19	368.42	391.53	375.80	4,503.61
	Cost	Rs./kWh	6.87	6.80	6.77	6.85	6.80	6.76	6.83	6.77	6.80	6.31	6.86	6.82	6.77
	Gene-	GWh	232.78	204.40	141.65	76.76	71.10	188.75	73.10	84.92	149.25	206.67	288.41	427.29	2,145.07
iə <i>n</i> pu	ration	%	1.86	1.60	1.23	0.75	0.99	2.43	0.92	1.22	1.71	2.04	2.38	3.31	1.78
iW voq	Fuel	Mln.Rs.	I	I	ı	ı	I	ı	I	I	I	I	I	I	
1	Cost	Rs./kWh	1	1	'	I	I	1	I	I	1	1	ı	I	

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			յոլչ	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	Total
	Gene-	GWh	56.63	59.76	61.94	62.02	42.20	48.78	54.80	54.65	70.88	70.83	62.62	57.05	702.17
ver Ver	ration	%	0.45	0.47	0.54	0.61	0.59	0.63	0.69	0.78	0.81	0.70	0.52	0.44	0.58
۰٥ ٥٥	Fuel	Mln.Rs.	-	1	-	ı	ı	ı	-	-	T	I	1	I	
1	Cost	Rs./kWh	-	T	-	I	I	1	-	-	1	1	1	1	•
ə	Gene-	GWh	75.31	94.09	110.28	65.56	55.46	86.39	86.90	80.96	91.09	88.63	113.45	109.25	1,057.38
sse	ration	%	09.0	0.74	0.96	0.64	0.77	1.11	1.09	1.16	1.04	0.87	0.94	0.85	0.88
6e	Fuel	Mln.Rs.	463.71	579.18	660.97	402.62	340.95	535.03	463.13	500.22	562.10	542.77	704.20	675.82	6,430.70
в	Cost	Rs./kWh	6.16	6.16	5.99	6.14	6.15	6.19	5.33	6.18	6.17	6.12	6.21	6.19	6.08
Not	te: As per u	data provided	' by CPPA-G												

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#### ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
AEDB	Alternative Energy Development Board
AJKHEB	Azad Jammu and Kashmir Hydel Electricity Board
AMRS	Automated Meter Reading System
BPC	Bulk Power Consumer
BTPL	Bahira Town (Pvt.) Limited
CCPP	Combined Cycle Power Plant
CDP	Common Delivery Point
CHASNUPP	Chashma Nuclear Power Plant
COD	Commercial Operation Date
CPGCL	Central Power Generation Company Limited
CPI	Consumer Price Index
CPP	Captive Power Plant
CPPA-G	Central Power Purchasing Agency-Guarantee
DEs	Diesel Engines
DISCO	Distribution Company
DOP	Development of Power
ECNEC	Executive Committee of the National Economic Council
EHV	Extra High Voltage
ELR	Energy Loss Reduction
FBC	Fluidized Bed Combustion
FESCO	Faisalabad Electric Supply Company Limited
GDP	Gross Domestic Product
GENCO	Generation Company
GEPCO	Gujranwala Electric Power Company Limited
GOP	Government of Pakistan
GST	General Sales Tax
GTPS	Gas Thermal Power Station
GWh	Giga Watt per hour
HDIP	Hydrocarbon Development Institute of Pakistan
HESCO	Hyderabad Electric Supply Company Limited
НРР	Hydropower Project
HSD	High Speed Diesel
HVDC	High Voltage Direct Current
IBC	Integrated Business Centre
ICB	International Competitive Bidding
IESCO	Islamabad Electric Supply Company Limited
	Independent Power Producers
	Internal Rate of Return
KANUPP	Karachi Nuclear Power Plant
	Korangi Combined Cycle Power Plant
	K-Electric Limited
κν Κ\/Λ	Kilovolt Amporo
	Kilovott Ampere Kilowatt – bours
	Labore Electric Supply Company Limited
LEGCI	Lakhra Power Generation Company Limited
MEPCO	Multan Electric Power Company Limited
MMRTU	Million British Thermal Unit
MMCFT	Million Cubic Feet

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MTOE	Million Tonees of Oil Equivalent
MVA	Megavolt Ampere
MW	Megawatt
MWh	Megawatt per hour
MYT	Multi-year Tariff
n.a. & n.p.	Not available and not provided
NCPP	New Captive Power Plant
NGPS	Natural Gas Power Station
NPCC	National Power Control Centre
NTDC	National Transmission and Despatch Company Limited
PAEC	Pakistan Atomic Energy Commission
PASMIC	Pakistan Steel Mills Corporation
PEDO	Pakhtunkhwa Energy Development Organization
PEPCO	Pakistan Electric Power Company Limited
PESCO	Peshawar Electric Supply Company Limited
PPA	Power Purchase Agreement
PPDB	Punjab Power Development Board
PPIB	Private Power and Infrastructure Board
QESCO	Quetta Electric Supply Company Limited
SCADA	Supervisory Control and Data Acquisition
SCARP	Salinity Control and Reclamation Project
SEPCO	Sukkur Electric Power Company Limited
SPP	Small Power Producer
STG	Secondary Transmission and Grid
SVC	Static Var Compensators
T&D	Transmission and Distribution
TESCO	Tribal Area Electricity Supply Company Limited
TOD	Time of Day
TOU	Time of Use
USAID	United States Agency for International Development
WAPDA	Water and Power Development Authority

#### SOURCE OF INFORMATION

The following sources of information have been used in the compilation of this State of Industry Report 2018:

- i) K-Electric Limited
- ii) Distribution Companies
- iii) All Independent Power Producers
- iv) Public Sector Generation Companies
- v) National Power Control Centre, NTDC
- vi) Private Power and Infrastructure Board
- vii) Alternative Energy Development Board
- viii) Water and Power Development Authority
- ix) Power System Statistics, Planning Power, NTDC
- x) Pakhtunkhwa Energy Development Organization
- xi) National Transmission and Despatch Company Limited
- xii) Tariff Petitions submitted to NEPRA by Distribution Companies
- xiii) Pakistan Energy Yearbook, Hydrocarbon Development Institute of Pakistan
- xiv) Others